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THE UNIVERSITY OF HONG KONG

THE IMPACT OF FENG SHUI LANDSCAPE ON RESIDENTIAL PROPERTY PRICES IN HONG KONG

A DISSERTATION SUBMITTED TO THE

FACULTY OF ARCHITECTURE

IN CANDIDACY FOR THE DEGREE OF

BACHELOR OF SCIENCE IN SURVEYING

BY

TAM SZE MAN

HONG KONG

APRIL 2009

Declaration

I declare that this dissertation represents my own work, expect where due acknowledgement is made, and that it has not been previously included in a thesis, dissertation or report submitted to this University or to any other institution for a degree, diploma or other qualification.

Signed: _____

Name: _____

Date: _____

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Abstract

Feng Shui, the traditional practice intends to achieve the harmony between human and nature. Its unique understanding of man-land relationship can provide a reference for urban setting. However, not many literatures focus on the impact of the Chinese traditional belief- Feng Shui on the real estate market. This thesis, therefore, studies the impact of many Feng Shui landscape principles, of harmonizing people and structures with their environment, on residential property prices in Hong Kong.

This study does not prove the validity of Feng Shui principles. It examines the impact of Feng Shui landscape on property prices. Structural characteristics, locational and neighborhood factors affecting the residential market in Hong Kong are first introduced. Hedonic Pricing Model is applied to study the common characteristics which determine property prices. This model confirms the hypothesis that Feng Shui landscape positively affects property prices. Feng Shui Landscape brings larger premia to housing prices during the boom than the slump periods. Regression analysis for this model would be applied so that property prices can be explained by means of estimating the prices of individual characteristics of residential properties.

Previous studies on Feng Shui traits usually focus on the effects of one Feng Shui

factor on residential property prices. The applications of these research results, in town planning and property management, are limited. This research endeavors to study how different Feng Shui landscape principles, together with some other main characteristics on residential properties, affect property prices in Hong Kong. By using a common model, the research results, as presented in this study, may assist future urban planning, development, property appraisal and even individuals'choices in property investment.

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Chapter 1

Introduction

1.1 Background

Feng Shui can be directly translated as “wind” and “water”. It is a traditional Chinese science of harmonizing the environment by balancing the energy. Feng Shui focuses on the well-being of the occupants to create a greater harmony, stronger sense of community, and higher quality of life. The practice of Feng Shui has been getting more attention in the construction industry, especially around the Pacific regions. In Hong Kong, where there is a large Chinese population, Feng Shui becomes a part of our daily lives. The architects sometimes apply the ideal Feng Shui model to the building designs. Individuals rely on Feng Shui to find a house that can bring the family health and wealth. Business communities consult Feng Shui practitioners when choosing offices and business locations.

There are mainly two schools of practices: the “Form” School (形勢派), and the “Compass” School (理氣派). The “Form” School assesses the reaction between the energy flow, “chi”(氣), and the environment. The “Compass” School uses a “pa kua” (八卦) and a kua number to assess the best energy flow for the occupants. These include concepts like “yin” (陰) and “yang” (陽), “chi”, and the Five Elements. “Yin”

and “yang” are symbolized by the moon and the sun. The changing combination of negative “yin” and positive “yang”, dark and light, cold and hot, creates “chi”. “Chi” around us promotes growth, health and vitality. Feng Shui and various divinity methods promote the understanding of the Five Elements. These elements include Water, Wood, Fire, Earth and Metal and they correspond to different aspects of nature and the body. Energy flows from one element to the next. The interactions of the elements can be “expansive” (相生), “destructive” (相剋) or “exhaustive” (相泄). Feng Shui practitioners aim to choose those good interactions which are beneficial to the occupants.

Feng Shui enhances the current planning process by evaluating the physical form through observation and management of the energy movement, “chi”. However, not many literatures focus on the impact of Chinese traditional belief- Feng Shui on the real estate market. Even if some western literatures begin to write Feng Shui, they mainly focus on the applications of Feng Shui in design or the vitality of Feng Shui in real practice.

With such a context, the effect of Feng Shui landscape principles on property prices in Hong Kong will be studied. It focuses on the residential market which dominates the

property developments nowadays.

In this dissertation, we may learn how to handle Feng Shui aspects, how to approach them critically, and how to harness Feng Shui in property development. Through exploration, we may come nearer to its hidden truth.[1] It is hoped that Feng Shui and its impact on property prices will bring additional insights to the scientific and rational approaches for our dynamic built environment.

1.2 Objectives

The main objectives of this research are:

- To investigate Feng Shui landscape theories and the Chinese culture
- To identify price determinants of the residential property market in Hong Kong
- To analyse whether people would pay higher price for property with "good" Feng Shui landscape by applying hedonic pricing model
- To study the effects of Feng Shui landscape on property prices during the

[1] Tam, C. M. Tso, Tony Y. N. and Lam, K. C. (1999) *Feng Shui and Its Impacts on Land and Property Developments*, Journal of Urban Planning and development, December,1999

boom and the slump periods

- To make a set of guidance for the professionals in real estate and construction industry to make adjustment of independent variable for the property prices
- To assist the town planners in the urban setting by introducing Feng Shui landscape principles

1.3 Framework

A literature review on theoretical background of property prices' determinations will first be illustrated as the foundation for discussion. The variables will be selected based on ideas suggested from previous studies and the local situations of selected housing estates. The principles of Feng Shui landscape will be investigated. Multiple linear regression models will be constructed to examine whether people would pay higher price for property with "good" Feng Shui landscape. The empirical results will be discussed to examine the significance and magnitude of the effects of the variables on property prices. This thesis will be concluded at last with a summary of findings and implications as well as limitations of this study.

There are six chapters for this research. Chapter 1 is Introduction. Background,

objectives and framework and importance of this study will be specified.

Chapter 2 is Literature Review. The Literature Review can be divided into two major layers. In the first layer, previous studies relating to the residential property prices will be discussed. Contributions of previous researchers with respect to the development of hedonic pricing model will be examined. Determinants of housing prices will be reviewed. Then, we will go through the luxury goods in the residential property market. In the second layer, Feng Shui culture and theories will be discussed so that we can conclude the reasons for using the “Form” School in this thesis. After that, the relationship between Feng Shui landscape and residential properties will be reviewed.

Chapter 3 will comprise of hypothesis and research methodology adopted in this study. The regression analysis technique for this dissertation will be studied. Applications and rationales of regression analysis will be introduced. There will be 4 steps for testing the effects of Feng Shui landscape on housing prices.

Data and sources will be studied in chapter 4. Data collection will be discussed firstly. Then the reasons for selecting Mei Foo Sun Chuen Phase 3 and Allway Gardens will be explained. Descriptive statistics of independent and dependent variables in this

research will be summarized. The way of processing the data will be discussed in detail. The sources and reliability of data will finally be discussed.

Chapter 5 is Results and Interpretations. All results will be listed out and the signs of effects will also be discussed. The proposed model's predictive power will be analysed.

In chapter 6, a conclusion will be drawn which will summarize the findings and implications of this study. Limitations of this study and further research areas will be examined.

1.4 Importance of this Study

Most literatures only focus on how structural, locational and neighborhood attributes affect housing prices. But the impact of Feng Shui cannot be neglected in an ethical Chinese society. If Feng Shui landscape is shown to be significantly affecting the housing prices, it will greatly assist property appraisal, town planning, property management and individuals' choices in property investment.

Whether Feng Shui landscape is a luxury goods will be tested in this dissertation. When the premia for Feng Shui landscape is much higher than the overall residential property prices, it is an indicator of residential market reaching the peak. Similarly, lower than the overall property prices means reaching the trough.

Chapter 2

Literature Review

2.1 Introduction

Many researchers have studied the issues of determinants of property prices. This thesis applies hedonic price model to generate hedonic prices. Literatures will be reviewed in this chapter to develop groundwork with supported theories for hedonic price equations. Also, traditional Feng Shui belief and its relation to science and properties will be explored. This would help us assess Feng Shui landscape as premia in the residential property market.

2.2 Hedonic Price Theory

Griliches (1961, 1971)[2] developed the hedonic price model to estimate hedonic prices of consumer goods in respect of quality change. Based on the hedonic hypothesis, Rosen (1974) analyzed supply and demand of the attributes which differentiate products in competitive markets. He modeled housing as a vector of

[2] Griliches, Z. (1961) *Hedonic Price Indices for Automobiles: An Econometric Analysis of Quality Change, Models of Income Determination*, Studies in Income and Wealth, 2, Columbia University Press for NBER and Griliches, Z. (1971), *Price Indexes and Quality Change*, Harvard University Press, Cambridge, Mass

traits that relates to the consumer's utility function. The interaction of bid functions of consumers and offer functions of suppliers produce the market clearing function. This function represents the hedonic price function. It is the marginal market trade-offs among various attributes associated with the goods. Rosen found that the hedonic function is neither a demand nor a supply function of properties alone. As an alternative, hedonic function is the locus of supply-equal-demand points for various attributes. As hedonic function shows that market prices are affected by many housing attributes, it is important for us to recognize the housing attributes when using the hedonic pricing model.

Linneman (1982)[3] examined transactions in a supermarket by using hedonic pricing model. An experiment of observing grocery shoppers as they went through the checkout line with different grocery items was carried out. The attributes are differences in family size, income, and other factors. For example, if he wanted to get a 7-oz can of beans' price, the model would generate a predictive price without looking at its price tag. This experiment confirms that if the researcher knows the total prices and the items purchased by the consumers, he can find out the 7-oz can of beans' price. This example shows that hedonic function measures only prices but it is

[3] Linneman, P. (1982). *The Economics of Urban Amenties: Hedonic Prices and Residential Location*. Academic Press, Inc., pp 69-88

not supply or demand functions.

2.3 Housing Attributes

Griliches (1971)[4] advised that finding all relevant characteristics is very important to hedonic pricing model. Butler (1982)[5] thought that attributes which are costly to produce and yield utility to residents should be considered. However, it is impractical to include numerous of housing attributes. Also, data with many characteristics are either unavailable or of very poor quality. Therefore, only variables which are most costly to produce and yield most utility to a resident will be included.

Key variables of property prices have been studied by many researchers. Different types of housing variables which should be included into the hedonic price model are now examined. Generally, the housing attributes are classified into three types:

Structural traits (S)

Locational traits (L)

Neighborhood traits (N)

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[4] Griliches, Z. (1971), *Price Indexes and Quality Change*, Harvard University Press, Cambridge, Mass

[5] Bulter, R. V. (1982), *The Specification of Hedonic Indexes for Urban Housing*, Land Economics, 58, pp. 96-108

The value of a property can be expressed as

$P = f(S, L, N)$

Price is expressed as a function of the above three factors as suggested by Mok et al. (1995)[6]

2.3.1 Structural Attributes

Structural attributes refers to the structure of a property. In hedonic researches, structural traits are widely used since they are the most elemental factors of a property. Rodriguez and Sirmans (1994)[7] and So et. al (1997)[8] found that the most important structural characteristics are age, floor level and size.

Wolverton (1997)[9] tried to find out the relationship between residential lot price and lot size using 2 models. The first model studied that lot size is a significant and positive determinant of prices. He then showed that there is a non-linear relationship between lot size and price. Law of diminishing marginal price effect was confirmed

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[6] Mok ,Henry M.K., Chan, Partick P.K. and Cho,Yiu-Sun , *A Hedonic Price Model for Private Properties in Hong Kong*, Journal of Real Estate Finance and Economics 10 (1995): 37-48

[7] Rodriguez, M. and Sirmans, C.F. (1994). *Quantifying the Value of a View in Single Family Housing Markets*, the Appraisal Journal, 62-4, pp 600-603

[8] So, H. M., Tse, R. Y. C. and Ganesan, S. (1997). *Estimating the Influence of Transport on House Prices: Evidence from Hong Kong*, Journal of Property Investment and Valuation, 15, 1, pp. 40-74

[9] Wolverton, M. L. (1997) *Empirical study of the relationship between residential lot price, size and view*, Journal of Property Valuation and Investment, 15, 1, pp48-57

in second model.

Kain and Quigley (1975)[10] examined the importance of number of rooms, baths, parcel area, first floor area, quality of dwelling units, parcels and block face. The results show that these attributes can affect property prices. Also, there is a relationship between payments for size and other housing traits. For instance, The premia for paying for newness varies according to housing size.

Mok et al. (1995)[11] showed that building age is a negative attribute to property prices in North Point. They found that floor level is a positive factor to housing prices because apartments with higher floor level enjoy better view. They also explained that if Gross Floor Area (GFA) is used as a proxy for living space, larger GFA leads to higher property prices. But it may be a pricing strategy that unit prices for bigger flats are slightly lower than that for smaller flats. In this case, the relationship between GFA and property prices is negative.

The structural variables which have been included in most researches in Hong Kong

[10] Kain, J. and Quigley, J. (1975) *Housing Markets and Racial Discrimination*, New York: National Bureau of Economic Research

[11] Mok, H.M.K., Chan, P.P.K. and Cho, Y.S. (1995) *A Hedonic Price Model for Private Properties in Hong Kong*, Journal of Real Estate Finance and Economics, 10, pp37-48

are less than those in foreign countries. Attributes like plumbing, heating and electrical system, basement, storm windows are important structural attributes as found by Grether and Mieszkowski (1974)[12]. However, these attributes are uncommon to Hong Kong.

2.3.2 Locational Attributes

These traits concern the locational characteristics of a property. Accessibility to social and economical facilities is usually included as locational attributes. The earliest literature concerning locational factors was done by Alonso[13] in 1964. He found that land prices in the city centre would be higher. Longer distance from the city centre lowers the land value. This is because the longer the distance of transportation, the higher the transportation costs. He suggested that when consumers are finding a suitable location for living, they care about the accessibility to a single work site. Assuming all customers are identical, there is a monotonic decline in site payments as distance from work increases. Apart from transportation costs, residents have to travel with longer time. As a result, lower site payments compensate the high transportation costs and there is a trade-off between accessibility and land value. Although this

[12] Grether D.M. and Mieszkowski P. (1974) *Determinants of Real Estate Values*, Journal of Urban Economics, 1, pp127-146

[13] Alonso, W. (1964) *Location and Land Use*, Cambridge: Harvard University Press

model is criticized by many researchers, this model has helped researchers to further investigate into the locational factors of property prices.

Mok et al. (1995)[14] found the actual distance from the subject properties in North Point to the Causeway Bay Mass Transit Railway (MTR) station. The MTR station is classified as the edge of Central Business District area (CBD). It was shown that property prices decrease with increasing distance from the CBD.

Another research showing the influence of transport on property prices was done by So et al (1997)[15]. They collected property prices from the same and large residential area in Querry Bay. That means similar locational characteristics and income groups can be kept. They defined that transport accessibility is the distances from the subject properties to the nearest MTR station, bus stop and minibus stop. The results showed the significance of those variables except buses.

Chau and Ng (1998)[16] studied the effects of improvement in public transportation

[14] Mok, H.M.K., Chan, P.P.K. and Cho, Y.S. (1995) *A Hedonic Price Model for Private Properties in Hong Kong*, Journal of Real Estate Finance and Economics, 10, pp37-48

[15] So, H. M., Tse, R. Y. C. and Ganesan, S. (1997). *Estimating the Influence of Transport on House Prices: Evidence from Hong Kong*, Journal of Property Investment and Valuation, 15, 1, pp. 40-74

[16] Chau, K.W. and Ng, F.F. (1998) *The Effects of Improvement in Public Transportation Capacity on Residential Price Gradient in Hong Kong*, Journal of Property Valuation and Investment, , 16, 4,

capacity on residential price gradient in Hong Kong. They found that with other things being equal, property prices on different locations differ due to different transportation costs from the location to CBD. An improvement in public transportation reduces time cost of commuting. The electrification of the Kowloon Canton Railway in 1982 had a negative impact on the price gradient between Shatin and Tai Po.

On the contrary, Kain and Quigley (1975)[17] argued that higher income and well-educated people tend to live farther away from CBD. It is because the countryside is less dense which leads to better air quality. It showed that neighborhood characteristics like air pollution and noise pollution can affect housing prices.

Apart from economic facilities, accessibility of social facilities should also be concerned. In 1973, Darling[18] included distance from urban water parks as social facilities. The water park provides aquatic recreational facilities for occupiers. The

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pp397-410

[17] Kain, J. and Quigley, J. (1975) *Housing Markets and Racial Discrimination*, New York: National Bureau of Economic Research

[18] Darling, A. H. (1973), *Measuring the Benefits Generated by Urban Water Parks*, Land Economics, 49(Feb),pp. 22-34

result showed that the positive effect increases as the distance between the property and the park decreases. Harrison (1978)[19] investigated the accessibility to schools and major highways. Mok et al. (1995)[20] studied the impact of accessibility to school zone, big estates, and entertainment facilities to property prices. .All of the above attributes are significant and poses positive impact to the property prices.

Megbolugbe (1989)[21] did not consider locational attributes because area of Jos was quite small (on average lengths of trip less than 1.5km). Another reason was that multiple employment centre existed in the town which made work trips unimportant in residential location decisions. Explanatory power of the model is high despite he ignored the locational attributes. Therefore, locational traits might not be necessarily included into hedonic pricing model when they are expected to be insignificant.

2.3.3 Neighborhood Attributes

Neighborhood attributes refer to the quality of the neighborhood of a subject property. Generally，they refer to socio-economic characteristics and physical nature of the

[19] Harrison, D. (1978), , Journal of Environment Economics and Management, 5,pp81-102

[20] Mok, H.M.K., Chan, P.P.K. and Cho, Y.S. (1995) *A Hedonic Price Model for Private Properties in Hong Kong*, Journal of Real Estate Finance and Economics, 10, pp37-48

[21] Megbolugbe, I.F. (1989) *A Hedonic Index Model: the Housing Market of Jos, Nigeria*, Urban Studies, 26, pp486-494

neighborhood. Sometimes, environmental problems are considered. Linneman (1980)[22] found neighborhood traits can explain 17% to 48% of the standardized variation in valuations. This shows that neighborhood traits are important to determination of property prices.

There are certain neighborhood attributes which affect property prices. Do and Grudnitski (1995)[23] analysed that golf course brings a positive impact to housing prices. Li and Brown (1980) [24]investigated crime and vandalism which lower property prices.

In 2006, Lee (2006)[25] studied the relationship between amenities and property prices. She found that provision of shopping mall and quality of school zone can enhance property prices significantly.

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[22] Linneman, P. (1980).*Some Empirical Results on the Nature of the Hedonic Price Function for the Urban Housing Market,* Jounal of Urban Economics*, 8, 47-68*

[23] Do, A.Q. and Grudnitski, G (1995). *Golf Courses and Residential House Price: an Empirical Examination*, Journal of Real Estate Finance and Economics, 10, 261-270

[24] Li, M. and Brown, H.J. (1980). *Micro-Neighborhood Externalities and Hedonic Housing Prices*, Land Economics, 54, 124-141

[25] Lee, S.Y. (2006) *The Effects of Amenities on Residential Property Prices,* BSc (Surveying) Dissertation, Department of Real Estate and Construction, the University of Hong Kong

Blomquist (1974) [26] showed that coal fired power plant is an undesirable trait to housing prices. Harrison and Rubinfeld (1976) [27] studied Boston metropolitan area and found that residents paid for air quality improvement. Nelson (1978)[28] proved that housing prices are negatively affected by air pollutants. Poon (1978)[29] found that noise and air pollution generated by Railways in London and Canada can reduce property prices. Freeman (1979)[30] confirmed that poor air quality poses negative impact to property values in America and Canada.

An index of noise was introduced by Vaughan and Huckins[31] in 1982 to examine the urban expressway noise in Chicago. The results show that high level of expressway noise disturbs people nearby. Simons et al. (1997)[32] examined the negative impact of underground storage tanks on residential and commercial properties. As quality of

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[26] Blomquist, G, (1974), *The Effect of Ekecturc Utility Power Plant Location on Area Property Value*, Land Economics, 50,1, pp.97-100

[27] Harrison, D.Jr. and Rubinfeld, D.L. (1976) *Hedonic Housing Prices and the Demand for Clean Air, Journal of Environmental Economics and Management*, 5, pp81-102

[28] Nelson, J.P. (1978), *Residential Choice, Hedonic Prices, and the Demand for Urban Air Quality*, Journal of Urban Economics, 5, pp357-369

[29] Poon, C.L. Larry, *Railway Externalities and Residential Property Prices*, Land Economics, 54,2 , pp. 218-227

[30] Freeman, A.M. (1979). *The Hedonic Price Approach to Measuring Demand for Neighborhood Characteristics*, The Economics of Neighborhood, pp 191-217

[31] Vaughan, R.J. and Huckins, L.E. (1982). *The Costs of Urban Expressway Noise*, Journal of Real Estate Finance and Economics , special edition, pp. 125-141

[32] Simons, R.A., Bowen, W. and Semetelli A. (1997) *The Effect of Leaking Underground Storage Tanks on Residential Sales Price*, Journal of Real Estate Research, 14, 1, pp29-42

drinking water was deteriorated by petroleum compounds, property prices were reduced.

The effects of nearby public housing are also considered. Schafer (1972)[33] investigated the impact of Below Market Interest Rate (BMIR) housing on property prices. However, results are not significant. Hugh's (1963)[34] results are more satisfactory. In his research, public housing reduced the subject property prices nearby. Rabiega et al. (1984)[35], on the contrary, proved that the benefits of amenities override the effects of disamenities (public housing). Therefore, property prices increase.

2.4 Luxury goods and consumption

Luxury goods are goods or services whose consumption at any given price rises more than in proportion to an increase in income.[36] The income elasticity (ε) of demand for luxury goods is more than unity. When income increases, a relatively greater

[33] Schafer, R. (1972). *The Effect of BMIR Housing on Property Values*, Land Economics, 48,pp 282-286

[34] Hugh, N. (1963). *The Effect of Public Housing on Property Values in St. Louis*, Land Economics, November 1963, pp433-441

[35] Rabiega, W. A., Lin, Ta Win and Robinson, L.M. (1984). *The Property Value Impacts of Public Housing Projects in Low and Moderate Density Residential Neighborhoods*, Land Economics, 60,2, pp174-179

[36] Black, J (1997). Oxford Dictionary of Economics, Oxford University Press.

amount of income is used to buy nonessential goods. Their relationship is shown in the following graph:

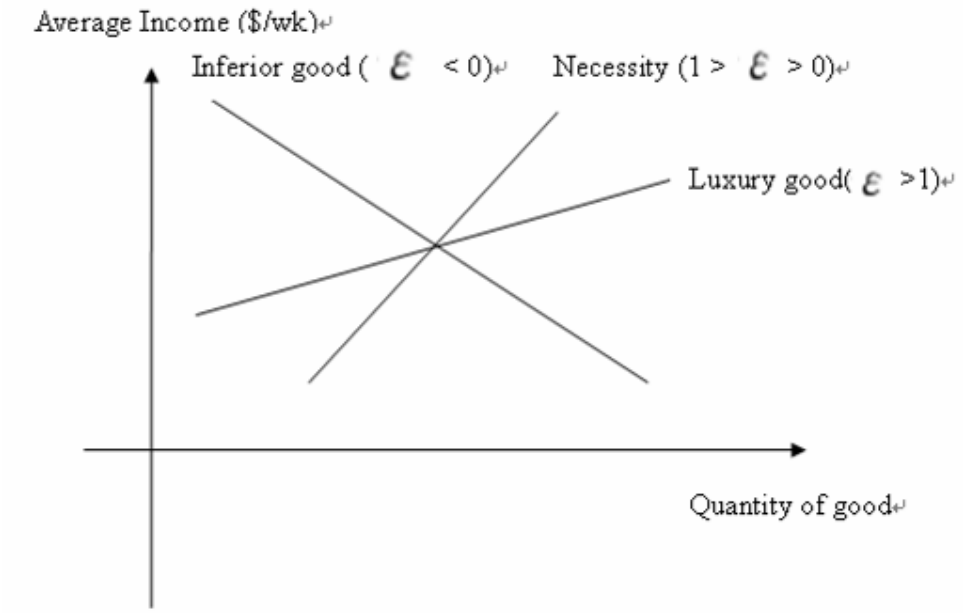

Fig.2.1 The relationship between average income and quantity of good

Richer people spend more than poorer people for luxury goods. It means that when the income level of a family increases, their abilities to buy more expensive goods also increase.

Veblen (1899)[37] attempted to explain the consumer behavior for luxury goods consumption. Product prices can obviously display their wealth. Katz (1997) [38] proposed that consumers with similar backgrounds prefer to buy similar goods and services. Their backgrounds are determined by their neighborhood, income, education,

[37] Veblein, T. (1899). *The Theory of the Leisure Class*, Macmillan, New York, NY.

[38] Katz, J. (1997). *The Joy of Consumption*, Regional Review, 7, 12

ethnicity and age. Schutte and Ciarlante (1998) [39] examined the consumer behavior in Asia and found that Asian people are very concerned about social recognition in a collectivist society.

Property prices can act as an indicator to represent the wealth in Hong Kong. The composition of wealth is mainly cash, property and stock of which the ratio is about 1.21: 1: 1.03 (Lau, 2000)[40]. A flourishing property market can increase the wealth of household. Ho (1997)[41] showed that home ownership is a way to accumulate wealth in Hong Kong especially during the boom period of property market. Therefore, property prices during the boom and the slump period should be investigated in order to show that Feng Shui landscape is luxury goods.

2.5 Traditional Feng Shui Belief and Science

Feng Shui is a traditional Chinese art of environmental planning which considers environmental and human factors for locational decisions. Ancient Chinese people

[39] Schutte and Ciarlante (1998), *Consumer Behavior in Asia*, New York University Press, Washington Square, New York, 62-63.101

[40] Lau, Y. K., (2000). T*he Effect of lucky floor Numbers on Residential Property Prices*, BSc (Surveying) Dissertation , Department of Real Estate and Construction, the University of Hong Kong

[41] Ho, W. M. (1997). *Home ownership: A means to wealth accumulation in Hong Kong*, M. Housing Management Dissertation

observe the surrounding environment to develop a unique man-land relationship. Nowadays, Feng Shui includes landscape, geomancy, ecology and visual arts. (Lee, 1986)[42]

2.5.1 Feng Shui Belief

Thousands of years ago, as Chinese civilization spread along the fertile Yellow River, Feng Shui principles also developed. The ancient Chinese found that a house located on the north side of the river receives optimal sun. This house is protected from strong winds and floods. It is easy for people to survive in this environment. Rice, vegetables and fruit bearing trees grow under an unhindered sun. The house stays relatively warm near to water. The environment is comfortable and harmonious. It helps inhabitants to survive and to become wealthy (Rossbach, 1984). [43]

Zang Shu（葬書），the earliest Feng Shui book，was written by Guo Pu (郭璞) in Jin Dynasty（晉朝）. The principles inside can be applied to all “yang” and “yin” houses. “Yang” houses are lived by people who are still alive whereas “yin” houses are lived by dead people. However, ancient Chinese people focused more on “yin” houses because they believed that “yin” houses affect people more in the long run. They

[42] Lee, S.H. (1986). *Feng Shui:Its Context and Meaning*, Cornell University

[43] Rossbach, Sarah (1984) *Feng Shui*, London : Hutchinson

highly respected their ancestors who can benefit their future generation if the ancestors live peacefully. As a result, most Feng Shui principles can only be applied in “yin” houses rather than “yang” houses.

2.5.2 Feng Shui Landscape and Science

Prospect- Refuge Theory

Appleton (1975)[44] studied the Prospect- Refuge Theory which is quite similar to an ideal Feng Shui location. Prospect means a wide view which is good for discovering enemies from far away distance. Refuge means a place suitable for not being discovered by other enemies and a place for sheltering.

In ideal Feng Shui landscape, “near front hill” (案山) and “far front hill”（朝山） provides a wide view for us and they can help us discover the enemies (Fig.2.2） . Feng Shui emphasizes that height and distance of nearby hills should suit the size of surrounding hills. Enclosed space prevents the “chi” from leaking out and prevents residents from outside intrusion. “Background mountains” (遠祖山) block the northern wind and the river prevents the enemies to come forward. “Water existing hills” (水口) form a safe entrance. To conclude, enclosed mountains, river and water

[44] Appletion,J. (1975). *The Experience of Place*. London: Wiley

existing hill form a natural obstacle which is the ideal Feng Shui location for living. Besides, when people realize there is a danger (Goffman, 1971; Warr, 1990; Fisher and Nasar, 1982)[45], they will escape and the river is a means of escape.

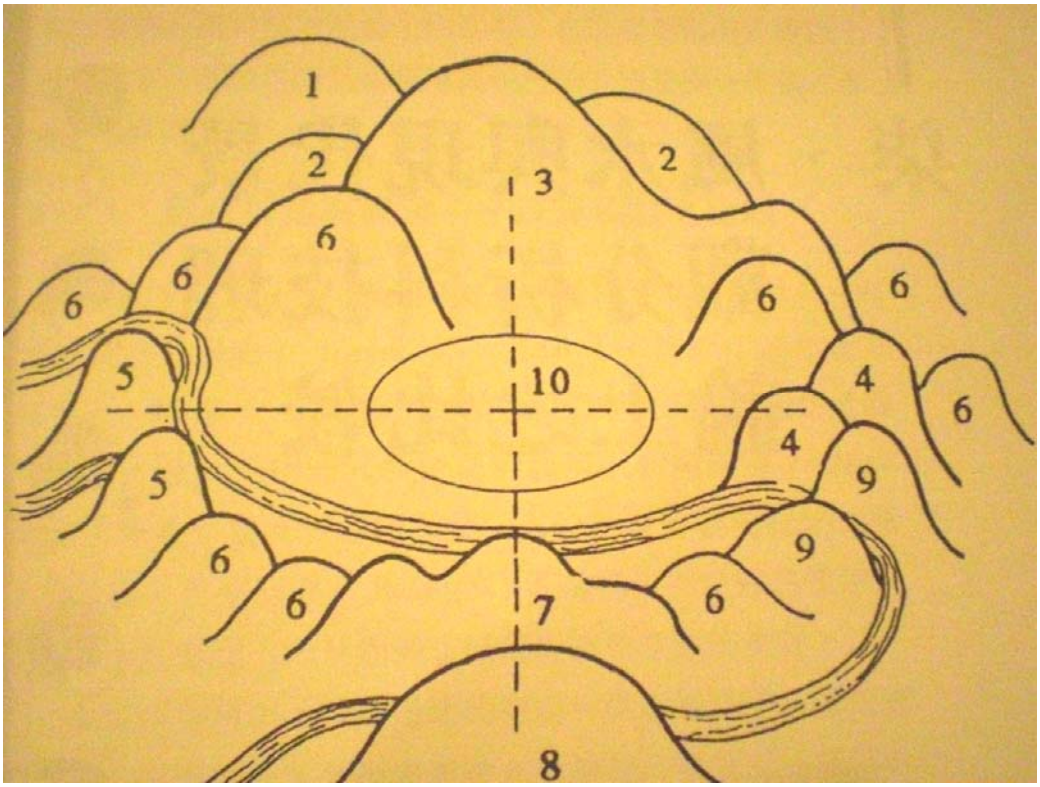

Fig. 2.2 The Pattern of the Ideal Feng Shui Location[46]

Where

1 and 2. Background Mountains (遠祖山)

3. Principle Mountain（祖山）

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[45] Goffman, E. (1971). *Relations in Public: Micro Studies of the Public Order*. New York: Harper &Row.

Warr,M.(1990). *Dangerous Situations: Social Context and Fear of Victimization*. Social Forces v.68:pp891-907

Fisher, B.S. and Nasar, J.L. (1992). *Fear of Crime in Relation to Three Exterior Site Features: Prospect, Refuge and Escape*. Environment and Behaviour V.24, No.1, Jan, pp35-65

[46] Han，K.Z. (1995) *Jing Guan Feng Shui Li Lun JiChu* ,Lian He Yin Zhi Chang You Xian Gong Si

4. Green Dragon （青龍）

5. White Tiger （白虎）

6. Protecting Hill（護山）

7. Near Front Hill (案山)

8. Far Front Hill (朝山)

9. Water Exiting Hill (水口)

10. Central Site (穴)

Formal Aesthetic Model

Zube (1984) examined that the Formal Aesthetic Model uses formal aesthetic elements like form, line, color, and texture to evaluate landscape. Normally, after the landscape architect considers the interrelationship of these elements, he/she would decide whether this landscape has balance, harmony, integrity, axis, dominance, variety.

As ideal Feng Shui location is usually located in natural environment, mountains have formed an important visual (form). The (line) consists of the outline of river and mountains. The (color) is usually the white of the cloud, green of the vegetation and mountains. The (texture) focuses on the trees, grass and rivers. “White tiger” (白虎)

and “green dragon”（青龍） (balance) the whole site. The “tortoise” （玄武）, “tiger”, “dragon” and “phoenix”（朱雀） form the implicit lines of the cross for (axis). For (harmony), houses integrate with the natural landscape. “Background mountains” and front view are (dominance). The combination of numerous elements and enclosed space of Feng Shui are the (variety) and (integrity). It can be seen that aesthetic model is very much like Feng Shui principles.

Psychophysical Model

Psychophysics attempts to find the mental sensation of human being towards landscape (Daniel and Vining, 1983)[47]. Kaplan (1972) and Ulrich (1979)[48] analysed that people like natural landscape rather than artificial landscape. However, if artificial landscape can balance the surrounding environment, the negative impact of artificial landscape can be reduced. This harmony of artificial elements and natural landscape is similar to Chinese Sky-human Coherence (天人合一).In Feng Shui , the location, color and shape of artificial buildings should match with the surrounding environment.

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[47] Daniel,T.c.and Boster, R.S.(1976). *Measuring Landscape Esthetics : The Scenic Beauty Estimation Method*. USDA Forest Service Research Paper RM-167

[48] Kaplan, S, Kaplan, R. and Wendt, J.S. (1972). R*ated Reference and Comlexity for Natural and Urban Visual Material*. Perception and Psychophysics v.12 pp 354-356

Ulrich, R.S. (1979). *Visual Landscapes and Phychological Well-being*. Landscape Resource v.4, pp 17-23

Psychophysics adopts certain natural elements as ideal landscape. They include water, vegetation, openness and distance. Further investigation proves that people like water which possesses the following characteristics: (1) clear, (2) can affect surrounding environment, (3) natural but not irregular shape, (4) enclosed by vegetation or hills, (5)moving but not steady, (6) form the main landscape, (7) accompanied by wide, distant prospect (Herzog ,1985, Yang and Brown,1992).[49] These researches are consistent with the principle of Feng Shui. In Feng Shui, water should be prevented from sand sentiment. The river should pass through a small front hill which has wide and distant prospect. Besides, vegetation was regarded as natural element by Ulrich (1985) and Smardon (1987)[50]. People like a half-opened flatland surrounded by trees. This requirement is similar to that in Feng Shui. “Ming tang” (明堂) is flatland surrounded by hills. As “ming tang” has “phoenix” in front of it, it forms a flatland with open space in front it. Finally, researchers found that people like the front view to be bright environment but not dark environment. An ideal Feng Shui location

[49] Herzog, T.R. (1985). *A Cognitive Analysis of Preference for Waterscape*. Journal of Environmental Psychilogy v.5pp 225-241

Yang, Byoung-E, and Brown, T.J.(2002). *A Cross-cultural Comparison of Preferences for Landscape Style and Landscape Element*. Environment and Behavior v.24, No. 4, July pp 471-507

[50] Ulrich, R.S. (1985). *Aestheic and Emotional Influence: Recovery from Surgery*. Science v.224, pp420-421

Smardon, R.C., Palmer, J.F., and Felleman, J.P.(1987). *Foundations for Visual Project Analysis*. New York: McGraw Hill

should capture the light “yang” from the sun and the background hill can prevent residents from intrusion of wind.

Psychological Model

Landscape Psychology was investigated by Kaplan (1982)[51] and this psychology can show one’s emotion when appreciating the environment. This study emphasizes the understanding of the coherence, legibility, complexity and mystery of landscape. Feng Shui location has a defined edge to form a complete enclosed space which can help people to appreciate the pattern of similar landscape. It is easy for us to forecast the landscape that cannot be seen (coherence and legibility). The variety of forms, colors and textures can enhance the (complexity) of the ideal Feng Shui location. Views behind mountains and vegetation can increase the feeling of (mystery).

2.6 **Feng Shui Landscape in Relation to Property**

2.6.1 Hong Kong Feng Shui Macro-Landscape

In Hong Kong, area along Victoria Harbor used to be the best Feng Shui landscape (Fig.2.3). This privilege has been weakening because the harbor is getting narrower.

[51] Kaplan, S. and Kaplan, R. (1982). *Cognition and Environment : Functioning in an Uncertain World.* New York: Praeger.

The harbor in-between Kap Shui Mun and Lei Yue Mun is straighter which cannot accumulate “chi”. However, good Feng Shui landscape in Hong Kong can be analysed below:

Fig. 2.3 Landscape along Victoria Harbor[52]

Deep Water Bay is supported by the Shouson Hill which acts as a “principle mountain” (祖山) at the back (Fig.2.4). Middle Island is located in front of Deep Water Bay and it is like a “near front hill” (案山) in the “Form” School. Deep Water Bay “engulfing the near front hill” (抱案入懷) represents the accumulation of wealth.

[52] Centamap(2009) www.cetamap.com [Accessed 13-2-09]

Fig. 2.4 Good Feng Shui Landscape of Deep Water Bay[53]

Another good Feng Shui landscape is Ting Kok in Tai Po (Fig.2.5). This place is surrounded by small front islands so that strong wind cannot directly intrude it. Houses in Ting Kok are enclosed by these islands which can be interpreted as "tortoise and snake enclosing water exit" (龜蛇鎖水口). Money can be accumulated in this area.

[53] Centamap(2009) www.cetamap.com [Accessed 13-2-09]

Fig. 2.5 Good Feng Shui Landscape of Ting Kok[54]

Area along the Tung Chung Line from Olympic to Kowloon Station is another good Feng Shui place (Fig. 2.6). This is because water flows slower in the New Yau Ma Tei Typhoon Shelter which is situated in front of this area. Apart from this, houses in Aberdeen and Ap Lei Chau (Fig. 2.7), residential buildings near Tsing Kwai Highway (Fig.2.8), and new estates in Tung Chung near the Hong Kong International Airport (Fig.2.9) are all “becoming wealthy place” (發富之地). That means residents can get richer after living there for a long period of time.

[54] Centamap(2009) www.cetamap.com [Accessed 13-2-09]

Fig. 2.6 Good Feng Shui Landscape from Olympic to Kowloon Station[55]

Fig. 2.7 Good Feng Shui Landscape of Aberdeen and Ap Lei Chau[56]

[55] Centamap(2009) www.cetamap.com [Accessed 13-2-09]

Fig. 2.8 Good Feng Shui Landscape near Tsing Kwai Highway[57]

Fig. 2.9 Good Feng Shui Landscape in Tung Chung[58]

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[56] Centamap(2009) www.cetamap.com [Accessed 13-2-09]

[57] Centamap(2009) www.cetamap.com [Accessed 13-2-09]

However, the bad Feng Shui landscape is characterized by water with poor quality in Hong Kong. Tin Shui Wan is surrounded by narrow rivers（Fig.2.10）. This place directly faces the Hong Kong Wetland Park. Water in the Wetland Park is in poor conditions and muddy. This landscape can bring negative impact to the economy and the behaviors of residents.

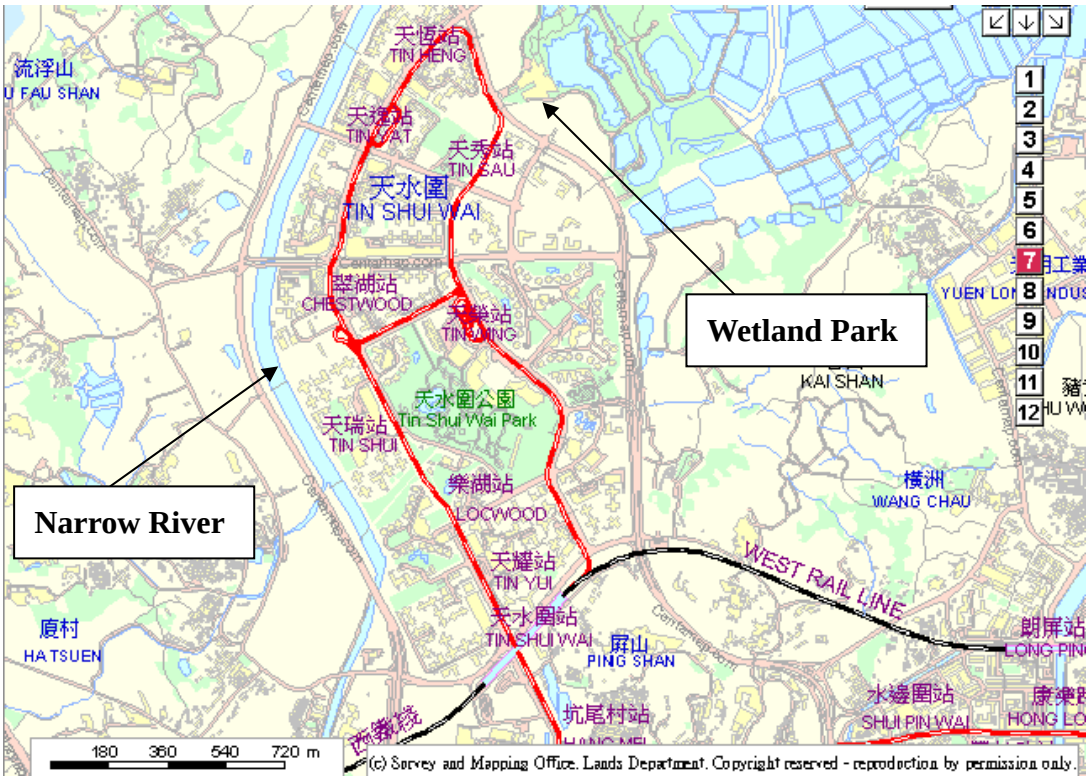

Fig. 2.10 Undesirable Feng Shui Landscape in Tin Shui Wai[59]

2.6.2 Feng Shui and Property

[58] Centamap(2009) www.cetamap.com [Accessed 13-2-09]

[59] Centamap(2009) www.cetamap.com [Accessed 13-2-09]

Feng Shui evolved from the observation that residents are affected by surroundings, layout, orientation of workplaces and apartments. Baum et al. (1984)[60] examined the important behavioral effects of certain architectural designs for a property, including lighting, windows, color and aesthetics. Feng Shui concerns similar factors as dimension, layout, lighting, and color scheme (Waring, 1993)[61].

The "Form" School of Feng Shui is a geographical and environmental science. The "Form" theory is indeed the conclusion of natural landscape observation. When Feng Shui is applied to choose a good site, this place should satisfy the basic Feng Shui requirements- accumulation of "chi" and balance of "yin" and "yang". Most experts agree that the protective armchair hill formation is a good site. The armchair is composed of powerful earthly beasts: the "green dragon" (青龍), the "white tiger"(白虎), the "black tortoise" (玄武), and the "vermilion phoenix"（朱雀）. The best site is backed by a high "black tortoise" mountain, flanked to the right by a fierce "white tiger", to the left by a slightly higher "green dragon" and facing with the lower "vermilion phoenix". The four animals, in addition to retaining and emitting their own "chi", trap the good "chi" flowing over the "phoenix"[62].

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[60] Baum, A., Bell, P., and Fisher, J. (1984). *Environmental psychology*. CBS College, New York.

[61] Waring, P. (1993). *The way of Feng Shui: harmony, health, wealth and happiness*. Souvenir Press, London, 52.

[62] Rossbach, S. (1984) *Feng Shui*, London: Hutchison

Another guideline is that living in a house with a wide and bright flatland, ‘‘ming tang’’ (明堂) would be ideal. “Ming tang” is the equilibrium point of “yin’ and “yang”. No matter how small the “Ming tang” is, it brings “chi” and is beneficial to occupants. “Ming tang” can be parks, podiums and football courts. Living in flats with ‘ming tang” outside would feel very relaxed. It also brings wealth and enhances the performance of jobs. If “ming tang” is the park, its beautiful environment is suitable for living. Most parks are flatland which is called “neat ming tang” (明堂整齊) in Feng Shui theory. However, if the park is equipped with too many rocks for decoration, this “ming tang” is regarded as irregular “ming tang”. People living inside would conflict with other colleagues and encounter difficulties in jobs.

Human needs and desires often conflict with ideals of natural harmony. Altering the land like building a railway or installing a swimming pool can disrupt the current “chi” and the balance of “yin” and “yang”. In premodern China, any changes to the land required Feng Shui practitioners. Like doctors, they find the ways to restore the balance of all earthly elements and “yin” and “yang”. The aim is always to bring earth and new construction into harmony with the natural rhythms of the universe.[63]With

[63] Rossbach, S. (1984) *Feng Shui*, London: Hutchison

small construction, human relationship may be affected, whereas large construction can indirectly cause accidents. The larger the area of construction, the worse the bad luck would be.

Highway is an important topic in Feng Shui. Different shape of highway can cause different effects. Those bridges in arch shape influence residents most. A building outside the curve of a highway would pick up the conflicting from traffic (Fig. 2.11). Vehicles on the road create vibration and severe vibration can accumulate bad “chi” to the nearby building. This is called “inverse bow water” (反弓水). It implies that people are ruthless, subordinates betray the supervisors, and people in the house would get hurt.

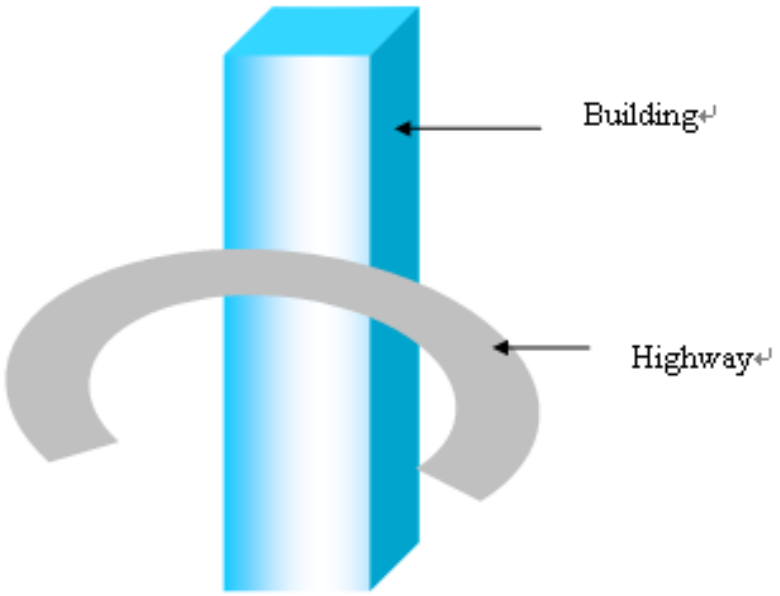

Fig. 2.11 Inverse Bow Water

Winding highway means good luck remains and bad luck is blocked (Fig.2.12). Such highway is especially good for students and employees on their academic results and promotion prospects.

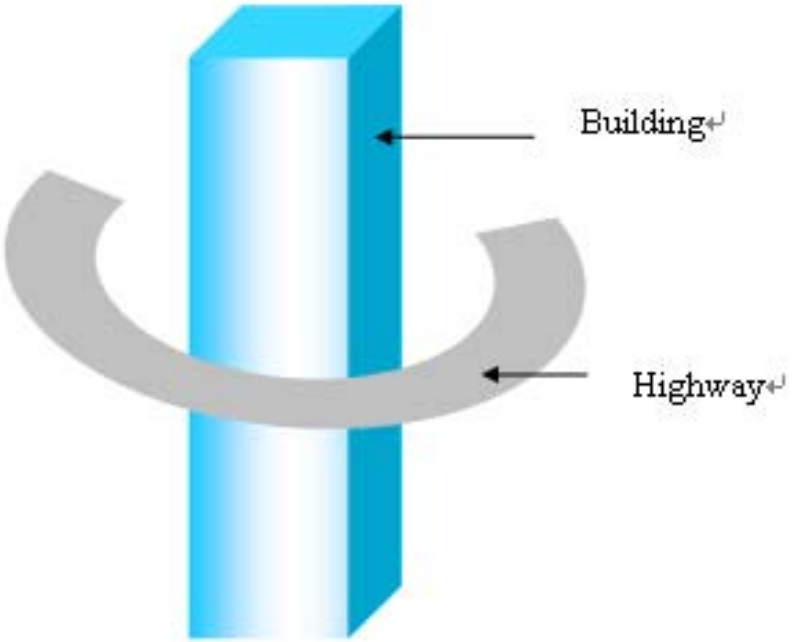

Fig.2.12 Winding Highway

A wide straight flyover splits into smaller ones which run in circular manner (Fig.2.13). The traffic slows down in the circular paths and helps store the energy there. In case the road runs towards the building after the circular motion, it would bring even more luck of health to the building.

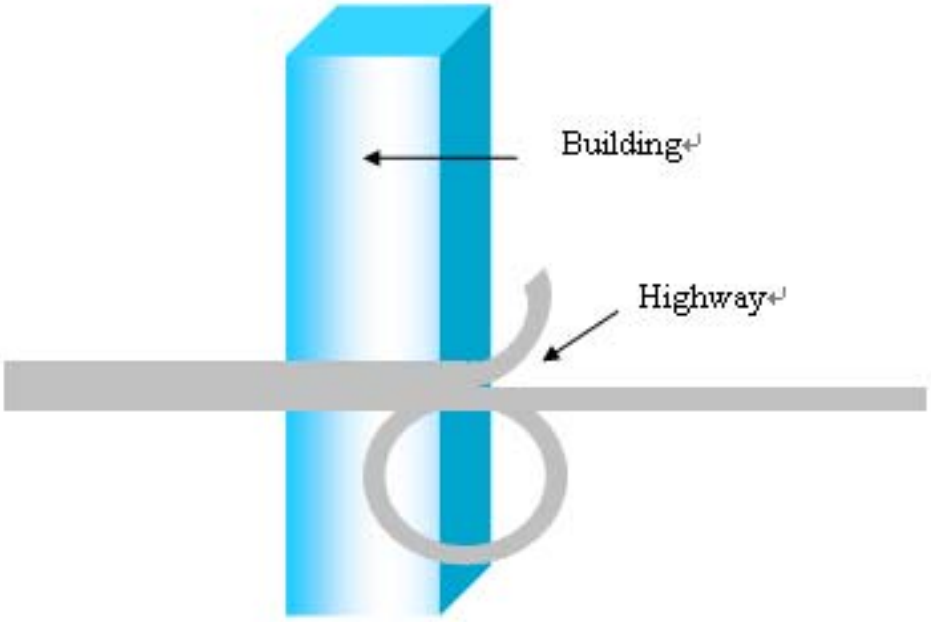

Fig. 2.13 Flyover Splits into Smaller Ones in Circular Manner

Straight flyover means the people are ruthless and money comes and goes quickly.[64] Vehicles on straight flyover are fast and creates bad “chi”. The bad “chi” can reduce the Luck of Wealth (Fig.2.14).

[64] So, M.F. (2004), *Fung Shui A Guide to Daily Application*, Universe Publishing Co.

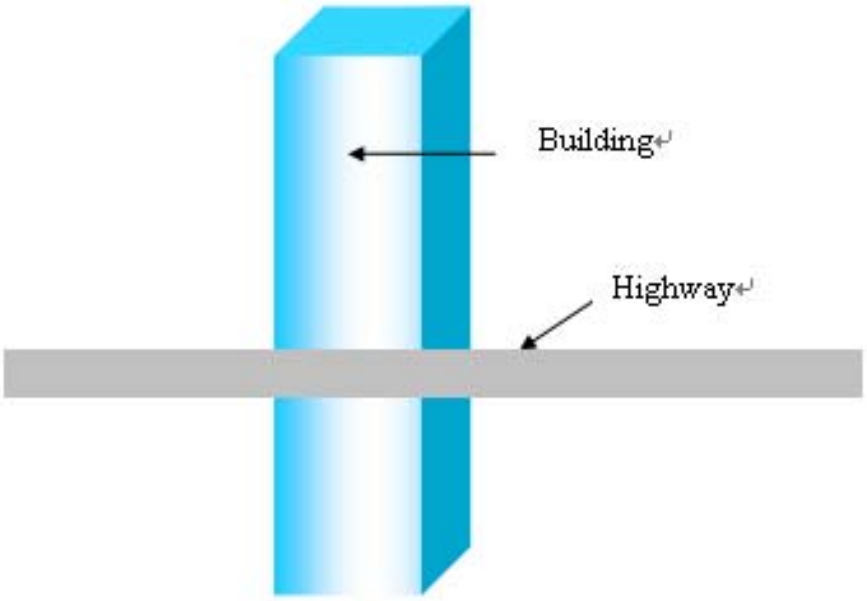

Fig. 2.14 Straight Highway

Noise such as construction work, vehicles' noise is regarded as bad luck from Feng Shui point of view. Its effects are significant to one's mental health. Small effects include poor concentration on work and ease of arguing with other people. Serious effects take account of accidents which is caused by poor concentration.

Another school of Feng Shui is the "Compass" School. As discussed in Introduction, The "Compass" School uses a "pa kua" (八卦) and a kua number to assess the best energy flow of a building. The most popular school under the "Compass" School is "Eight House Theory" (八宅派). However, "Eight House Theory" concerns the date of birth of residents. So, this dissertation only applies the "Form" School which is the

fundamental theories of Feng Shui landscape to the hedonic pricing model.

The Hong Kong government seems acutely aware of Feng Shui, especially in the rural areas. Before commencing housing projects and public works, or resiting villages and graves, district officers or corporate planners would consult with village leaders about Feng Shui landscape.

Tam, et.al. (1999)[65] investigated the effect of Feng Shui on housing prices and proved that there is a relationship between them. The scope of this study is the 4 beasts: the "green dragon", the "white tiger", the "black tortoise", and the "vermilion phoenix". These Feng Shui entities are hill areas adjacent to rural communities. Although many variables can affect housing prices, only Feng Shui, accessibility and building age are targeted.

The research is based on 15 villages in Tai Po East (Ting Kok area) to identify the effects of Feng Shui on housing prices. It was found that the correlation between Feng Shui and housing prices is the highest one, yielding a regression coefficient of 0.95. Feng Shui has become a symbol of harmony between environment and individuals.

[65]Tam, C. M., Tso Tony Y. N. and Lam, K. C. (1999) *Feng Shui and Its Impacts on Land and Property Developments*, Journal of Urban Planning and development, December,1999

Hence, it dictates villagers' expectations and responses to housing prices (Fig. 2.15). However, this study is a very small scale investigation. Only village and farms were investigated which belong to insignificant residential market in Hong Kong.

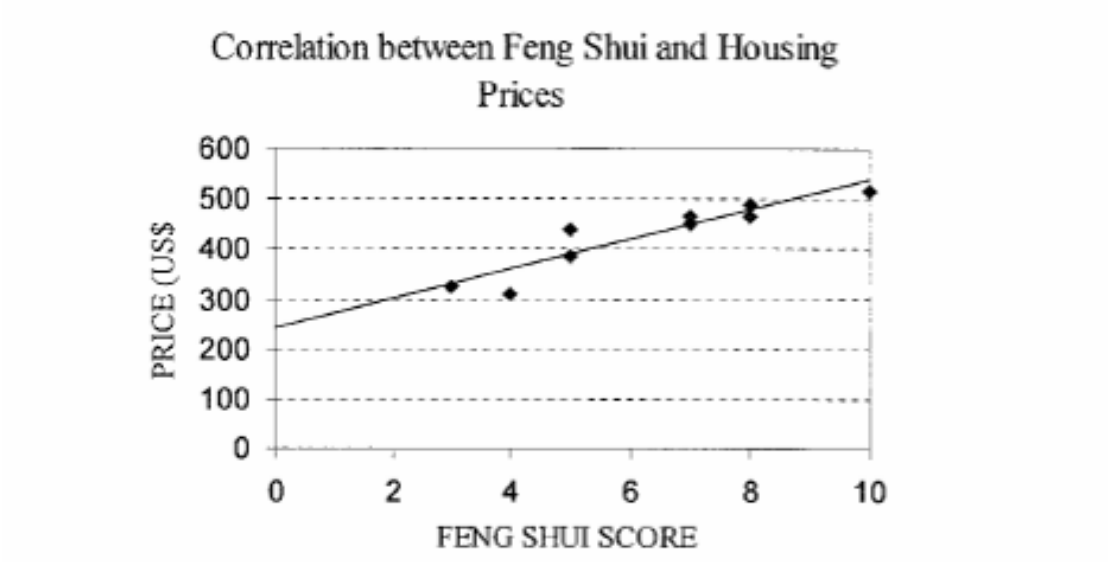

Fig.2.10 Correlation between Feng Shui and Housing Price

In 1999, Bourassa and Peng[66] investigated lucky house numbers of Auckland and New Zealand. The results demonstrated that lucky numbers can positively affect housing prices in areas with large proportion of Chinese residents.

Lau (2001)[67] studied the impact of sea view, a Feng Shui landscape, on property

[66] Bourassa, S.C. and Peng, V.S.(1999). *Hedonic Prices and House Number: the influence of Feng Shui,* Internation real Estate Review, 2(1), pp1-16

[67] Lau, C. P. (2001), *An Empirical Study on the Impact of Sea View on the Risk and Return of Residential Property Investments,*BSc (Surveying) Dissertation, Department of Real Estate and Construction, the University of Hong Kong

prices in Taikoo Shing. The presence of a sea view can increase the volatility of property prices. The implicit value of sea view amenity increases over time. It was explained by the fact that sea view amenity is relatively limited in supply.

Yeung (2005)[68] showed that all buyers require compensation when purchasing graveyard view properties. It is because purchasers are dominant by ethical Chinese. Graveyard view reduces the resale power of properties and exerts extra stress on occupants.

2.7 Concluding Remarks

In conclusion, very few researchers look into the relationship between property prices and Feng Shui. Even if some studies refer to Chinese traditional beliefs on property prices, only one Feng Shui landscape factor is focused such as sea view and graveyard. Lucky numbers, however, is a traditional belief but not Feng Shui. Different people have different lucky numbers from Feng Shui point of view. The interpretation of numbers in Feng Shui is originally based on the magic square of nine numbers (1 to 9)

[68] Yeung, Y. T. (2005) *The Effect of Chinese Culture on the Implicit Value of Graveyard View in Hong Kong Rsesidential Property Market,*BSc(Surveying) Dissertation, Department of Real Estate and Construction, the University of Hon Kong

called “lo shu” (洛書). Numbers are calculated on an individual’s birth date to arrange Feng Shui elements that best fit his/ her personality. So，previous findings of lucky numbers cannot be regarded as Feng Shui.

Chapter 3

Methodology

3.1 Introduction

As discussed in Literature Review, the hedonic pricing model explains the relationship of housing attributes and price. This chapter is going to outline how hedonic pricing model is employed in this dissertation. The main theme of this dissertation is to reveal the impact of Feng Shui landscape on property prices. The criteria in choosing relevant data set will also be covered in this chapter.

3.2 Hedonic Pricing Model

3.2.1 Concepts of Hedonic Pricing Model

The Hedonic Pricing Model was introduced by Rosen (1974)[69]. This model has been adopted by many real estate researchers. This method can understand the extent of impact of attributes on property prices. Therefore, Bulter (1982)[70] explained that a hedonic model should only include housing attributes that are valuable to produce and yield utility to residents.

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[69] Rosen, S. (1974) *Hedonic Prices and Implicit Markets: Product Differentiation in Pure Competition*, Journal of Political Economy, 82, 1

[70] Butler, R.V. (1982), *the Specification of Hedonic Indexes for Urban Housing*, Land Economics, 58, pp96-108

Residential traits can be classified into three categories: structural traits (*S*), locational traits (*L*) and neighbourhood traits (*N*). A property price donated by (*P*) can be expressed as:

$P = f(S, L, N)$

where

P = dependent variable

S, L, N = independent variables

Rosen (1974)[71] proposed the partial derivatives of the function should be interpreted as the implicit marginal characteristic prices or hedonic prices. Linneman (1980)[72] held that partial derivatives are the marginal change in the total site valuation associated with a change in that trait when keeping other traits' levels constant. When the relationship between dependent and independent variables is linear, the equation can be specified as:

$P = a_0 + \Sigma a_i L_i + \Sigma b_j S_j + \Sigma c_k N_k + \varepsilon$

where

a_0 *= constant term*

a_i, b_j *and* c_k *= coefficients of the corresponding variables;*

[71] Rosen, S. (1974) Hedonic Prices and Implicit Markets: Product Differentiation in Pure Competition, *Journal of Political Economy*, 82, 1, pp34-55

[72] Linneman, P. (1980) *Some Empirical Results on the Nature of the Hedonic Price Function for the Urban Housing Market*, Journal of Urban Economics, 8, pp47-68

L_i = *variables for location trait i;*

S_j = *variables for structural trait j;*

N_k = *variables for neighborhood trait k;*

ε = *stochastic or error term.*

P= property price of units

By differentiating the equation with respect to different traits, we can get

$\Delta P / \Delta Li = a_i$; $\Delta P / \Delta S_j = b_j$; $\Delta P / \Delta N_K = c_K$

The regression coefficients a_i, b_j, c_k determine the changes in P associated with a unit change in the corresponding variable (*S, L, N*) while holding other factors constant. This means that when other things being equal, one unit change in L_i, S_j, N_k will lead to a change in *P* with the magnitude of a_i, b_j, c_k respectively. These regression coefficients actually manage the hedonic prices of the corresponding housing attributes. The coefficients of the tested items, the Feng Shui landscape attributes, will evaluate its effects on property prices.

3.2.2 Ordinary Least Square (OLS) Technique

Another question is how these regression coefficients can be computed. Multiple regression analysis is used to estimate all attributes. Regression analysis is a

statistical technique for examining the relationship between the dependent and independent variables. The most common method of estimating the parameters of the regression model is the Ordinary Least Squares (OLS) technique. OLS technique estimates the function by minimizing the residual sums of square. As a result, the best solution to the regression function can be found. This technique will be implemented in this study.

3.2.3 Dummy Variables

In this study, dummy variables will be used to indicate the availability of certain traits. Dummy variables, such as the existence of a park, are often used to model qualitative factors which affect the dependent variable (P). They are commonly applied to deal with discontinuous factors which assume only two values, either 0 or 1. Usually, these factors possess only ‘yes/no’ in character. A dummy variable will take a value of 1 when ‘yes’ and 0 when ‘no’, or vice versa. These discontinuous factors are essential to be included in the hedonic pricing model as they contribute as a significant part for variation in property prices.

Assuming there is a linear relationship between property prices, age and floor level and error variance is constant over the whole data set, we introduce park (PK) as a

dummy variable. The model can be specified as:

$$P = a_0 + \Sigma a_i L_i + \Sigma b_j S_j + \Sigma c_k N_k + dPK + \varepsilon$$

where PK = 1 for the existence of a park and 0 otherwise

This equation has taken the effect of a park into consideration for property prices' analysis. The regression coefficient *d* represents the effect of existence of a park on property prices. It helps to explain the effect such as sign and magnitude of the coefficient when a particular condition is satisfied. *d* would be a positive number as purchasers would be willing to pay an extra premium for a flat possessing a park in Hong Kong. In general, when a qualitative factor can be categorized into n different categories, (n-1) dummy variables are required to model the effects of the factors.

3.2.4 T-statistics

T-statistics is used to test the statistical significance of the effect of an independent variable on the dependent variable. In this dissertation, significance is the possibility that a property price (P) is influenced by different housing traits. Significance has nothing to do with the magnitude of the effect by the independent variables. For example, a housing trait can be very significant (high t value) but the effects of this trait on property prices can be very small.

The value of t depends on the regression coefficient of an independent variable (b_i) and the standard error of that coefficient (Sb_i). T-value for the independent variable can be expressed as:

$t_i = | b_i / Sb_i |$

The larger the t-value, the more accurate the estimate as the likelihood of b_i=0 becomes less. In determining whether an independent variable is significant, one has to decide the significance level for the regression coefficient being zero. When we are 95% sure that b_i is non-zero, we can say that b_i is significant at the 5% level, i.e. the chance that b_i=0, is only 5%(type-I error). We can also say that the b_i is significant at 95% confidence level.

Likewise, p-value is usually used because it represents the type-I error, i.e., it shows the chance that the estimated coefficient is equal to zero. The smaller the p-value, the more significant the estimated coefficient. Given a p-value, p, the estimated coefficient is “significant at the x (x>p) level”.

3.2.5 Coefficient of Determination – R^2

The coefficient of determination R^2 indicates the proportion of variation in the dependent variable explained by the variation in the independent variables. R^2 ranges from zero to one. It is often used as a measure of goodness of fit. A large R^2 means that the regression equation is better fit. That is, the higher the R^2, the higher the predictive power of the estimated model. The coefficient of determination will certainly not be equal to 1. The remaining part, $(1-R^2)$ x 100% variation, cannot be explained neither by the independent variables nor the regression model. However, R^2 increases as more independent variables are added to the equation irrespective of whether these variables are significant. Adjusted R^2 can tackle this problem.

Adjusted coefficient of determination measures the proportion of variance (variation divided by degree of freedom) of the dependent variable explained by the variance of independent variables. For small degree of freedom (normally large number of independent variables relative to the sample size), the R^2 should be adjusted downward. The difference between the two is small when the degree of freedom is large (>30) i.e. when the sample size is large relative to the number of independent variables.

However, adjusted R^2 is normally not the sole criteria for model selection. The R^2

and adjusted R^2 of two models with different dependent variables cannot be compared.

3.3 Development of Hypothesis

3.3.1 Functional Forms Adopted in this Study

A suitable functional form is very important for regression analysis because the results depend greatly on the functional form. It should be noted that no one best function form is suggested from literatures. Some researchers suggest the use of Box-Cox transformation[73], but this method cannot guarantee optimal functional form. The semi-log model is employed to minimize the effect of heteroskedasticity in this study. This form is the most popular specification for hedonic pricing model. Owning to differences in characteristics of the housing estates, not all variables will have significant effects and the model is subject to minor amendment in each formula.

3.3.2 Dependent variable

Real Transaction Price (P)

There is time effect on data because the transacted housing prices are always affected

[73] Box, G. and Cox, D. (1964). *Analysis of Transformation*, Journal of the Royal Statistical Society Series, 1964, B, pp211-252

by the changing economic environment. Neglecting the time effect would cause overestimation or underestimation of the real housing prices. Adjusting the data is needed in order to reduce the time effect. Nominal price is property price at the date of transaction. Real price is the deflated nominal price, reflecting the “real” price of a property. Property prices are all deflated by the Private Domestic Price Indices which are published by the Rating and Valuation Department with respect to transaction months and districts of properties. Deflated transaction prices are then free from the inflation or time effect because all the sale price indices have the same base month, December 1998. The price index of this base month is 100.0.All prices will be set at the same price level.

Price per unit area will not be considered in this study because the Feng Shui landscape enjoyment will not increase by increasing the size of the premises. Rent of different properties will also not be included to avoid extra price-affecting characteristics.

3.3.3 Independent variables

Gross Floor Area (GFA)

This variable donates the gross floor area of a property. GFA is used as a proxy for

living space in the apartments. It measures the willingness of people to pay for additional gross floor area. It is expected the larger the GFA, the higher the real transaction prices. .

Square of Gross Floor Area (GFA^2)

Square of gross floor area is introduced because the increasing effect is anticipated not to grow straight upwards. Further increase in size can be crucial to small- and medium-sized apartments because additional area gives a more spacious feeling. However, it may not be a significant indicator for large-sized apartments because additional area is not an important factor for purchasers of this kind. As a result, the expected sign of this coefficient is negative.

Floor Level (FL)

FL is the floor level on which an apartment is located. It is expected that the higher the level, the more expensive the apartments because owners can enjoy better scenic view at higher floor. Also, any annoying noise from roads cannot reach this higher level.

Square of Floor Level (FL^2)

Similarly, for square of floor level, the effect of the advantages of higher floor level is expected to be diminishing. Consequently, the anticipated sign of this coefficient is negative.

Age (AGE)

Age shows the physical depreciation of a building. It is calculated from the date of issuing occupation permit to the transaction date in a yearly basis. As a building is getting older, it will depreciate both physically and functionally. Furthermore, the maintenance costs should also increase with building age. Therefore, a negative coefficient is expected implying that increase in age will lower a property price.

Location (L)

Previous literature reviews show that location is an attribute for property prices. Properties in Mei Fu Sun Chuen Phase 3 and Allway Gardens are investigated. The location attribute shows the distance from the MTR exit and the bus terminal. They are measured by using location maps in metres. Public transport facilities are convenient and reliable. Therefore, close proximity to the nearest public transport facilities may be especially important to occupants. However, a few researchers find that residential properties possessing a good location to public transport may be a

penalty to prices due to air and noise pollutions. Whether location is an advantage or a disadvantage should be investigated in this model.

Square of location (L^2)

Whether the advantages or disadvantages of location are expected to be increasing or decreasing can be found by adding square of location in hedonic price equation. The sign is not predictable at this stage.

Swimming Pool View (POOL)

Apartments with swimming pool view are good choices for occupants. These apartments provide a relaxing and spacious feeling that most people prefer. All units facing the full swimming pool view is assigned as a dummy 1. Otherwise, it is assigned a value 0. It is expected that units with swimming pool view will generate higher transaction prices.

Partial Swimming Pool View (PPOOL)

When a property has its dinning room and bedrooms subject to swimming pool view, it is classified as full swimming pool view. If only its bedrooms are subject to swimming pool view, it is classified as partial swimming pool view. The rationale of

using the above categorizations is twofold. Firstly, the window size of dinning rooms is usually larger than those in bedrooms. The impact of degree of swimming pool view that a property absorbed will be larger in dinning rooms than in bedrooms. Secondly, residents spend more time in dinning rooms than in bedrooms. The quality of view in dinning rooms should be more important than in bedrooms and it is believed that the impact of swimming pool view in dinning rooms is more significant than those in bedrooms. The above rules provide a more objective judgment on the quality of swimming pool view.[74]

Park View (PK)

Lai Chi Kok Park is a large park in Mei Foo Sun Chuen Phase 3. Park view brings premia to property prices. It provides residents with open view. In Hong Kong, buildings are packed very closely and the supply of park view is limited. Therefore, park view can have positive impact on property prices. It is further classified into different quality. The purpose of this is to minimize the subjective judgment on the quality view as it may lead to biased results. Park view amenities can be classified into two classes, full park view and partial park view.

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[74] Yeung, Y. T. (2005) *The Effect of Chinese Culture on the Implicit Value of Graveyard View in Hong Kong Rsesidential Property Market,*BSc(Surveying), Department of Real Estate and Construction, the University of Hon Kong

Partial Park View (PPK)

As discussed in partial swimming pool view, when a property has its dinning room and bedrooms subject to the park view, it is classified as full park view. If only its bedrooms are subject to park view, it is classified as partial park view. Units with partial park view are assigned as dummy 1 and 0 if otherwise.

Boom Period (B) and Slump Period (S)

For classifying a period that is the boom or the slump, the first step is to find out the average monthly price indices of the Rating and Valuation Department from January 1996 to December 2007. The reason for choosing marketing price indices but not individual estate price indices is that it reflects the overall market performance and allows comparison between different estates within the same boom and slump periods. To test whether the premia of Feng Shui are higher during the boom period, an interaction term B*FS is added to equation (5) and (6). Data are sampled from one six-month period. The period represents the boom of the property cycle in Hong Kong. The boom period is from May 1997 to October 1997. During this period, the property price index surges to a high record of 181. For the slump period, the period is from March 2003 to August 2003 where the lowest price index is only 58.4. In

general, the peak period is before the Asian Financial Crisis while the bottom period is mainly brought by the effect of the outbreak of SARS.

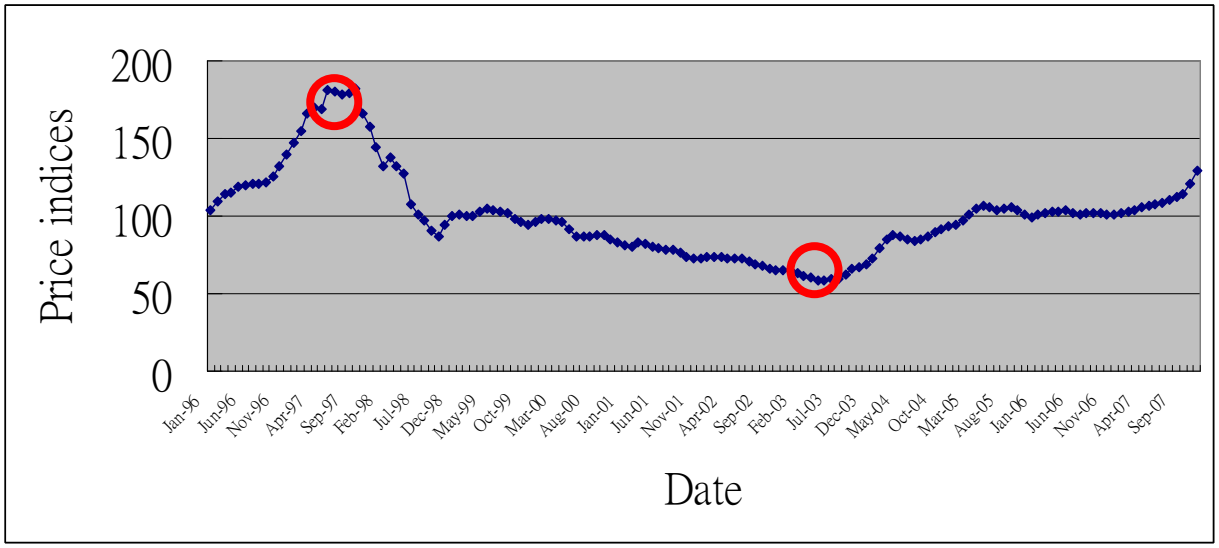


Fig. 3.1 the Boom Period and the Slump Period for Domestic Monthly Price Indices

Feng Shui Landscape (FS)

The “Form” School is commonly used for the Feng Shui practitioners. The “Form” School will be implied in this thesis. In testing Feng Shui landscape, the criteria are quantified by a hierarchical scoring system from 0 to 10 where ‘‘0’’ is the lowest order (poorest Feng Shui) and ‘‘10’’ is the highest (best Feng Shui). The scoring methods depend on the shape, location, size and view of each element. It is expected that good Feng Shui landscape will increase property prices.

Square of Feng Shui Landscape (FS^2)

Feng Shui landscape can positively affect property prices with increasing or decreasing rate. But the sign of this variable is unpredictable at this stage. The principles of this FS trait are generated from all Feng Shui landscape traits as follows:

3.3.4 Feng Shui Variables

Hospital (HL)

According to the principles of Feng Shui, facing hospital is not suitable for residential properties. Lower floor level apartments are affected by a hospital more than higher floor level apartments. Occupants cannot cope with the bad “chi” if they stay at home for a long period of time. They would suffer from illness. If units are located near the hospital, the dummy variable should be 1 and with 0 if otherwise (Appendix 1) .

Highway (HW)

As mentioned in Literature Review, highways of different shapes exert tremendous influences on buildings nearby from Feng Shui point of view. Units facing the highway are assigned as a dummy 1. Otherwise, it is assigned a value 0. In Mei Foo Sun Chuen Phase 3, the highway is straight and located near some units which means people living there are pitiless and money comes and goes easily. It is because in a straight highway, the speed of vehicles is fast which gives rise to bad “chi”. The bad

“chi” is brought to the units and eliminates the Luck of Wealth (Appednix 8).

School (SL)

School is a place for learning. Most people misunderstand that the fresh “chi” created by students is large. So it should be classified as good luck especially for those who have poor health. However, noise brought by students such as music may be disturbing as regarded by some people. Also, during the summer holidays, nobody is at school. The occasional noise in normal school days and sudden quiet environment in holidays create an irregular environment which is not good in Feng Shui. In Mei Foo Sun Chuen Phase 3, Delia Memorial School is the subject school. CCC Kei Wai Primary School and HK Adventist School of Nursing are situated in Allway Gardens. If units are near to a school, they are assigned as a dummy 1 and 0 if otherwise (Appendix 2).

Construction Work (CW)

According to the MTR Corporation, Mei Foo was under construction for West Rail Line from 28th January, 2000 to 25th March, 2002. As discussed in Literature Review, such large construction work disrupts the current “chi” and upset the balance of “yin” and “yang”, causing harm to health. In adverse situations, accidents may be triggered.

Therefore, property prices are expected to be lower during construction period. If transactions are within the period of construction, the digit of dummy variable should be 1. Otherwise, the variable is coded with 0.

Noise (NE)

Vehicles' noise from the bus terminal can affect one's mental health as discussed in Literature Review. Allway Gardens has bus terminal which creates noise to the nearby apartments. The occasional noise from bus terminal disrupts the regularity of "chi". However, bus stop is different from bus terminal. The noise from bus stop is good as the noise is constant which creates a stable environment. If the units are located near the bus terminal, the dummy variable should be 1 and with 0 if otherwise.

Hill (HILL)

Feng Shui experts believe that mountains and water are interdependent. An apartment's front should be symbolized as vermilion phoenix (朱雀) which means water flow. Units facing the hill would block the normal "chi" to come into the rooms. If the hill is very near to the front of a unit, it also causes pressure to the people living inside. The best location of the hill is located at the back of a unit which means it

supports the house as a tortoise (玄武) as mentioned in Literature Review. Therefore, penalty is added and it represents as 1 for the dummy variable if a unit is facing the hill (Appendix 3).

Embracing Road (ER)

A building having some distance from the inside curve of a road is said to have "embracing fondness"(玉帶環腰). The building accumulates energy which improves the family relationship of the occupants. Wealth would be increased and accumulation of money would be very easy (Fig. 3.2). In Allway Gardens, some blocks are embraced by the road which is coded with 1 as digit of variable (Appendix 4).

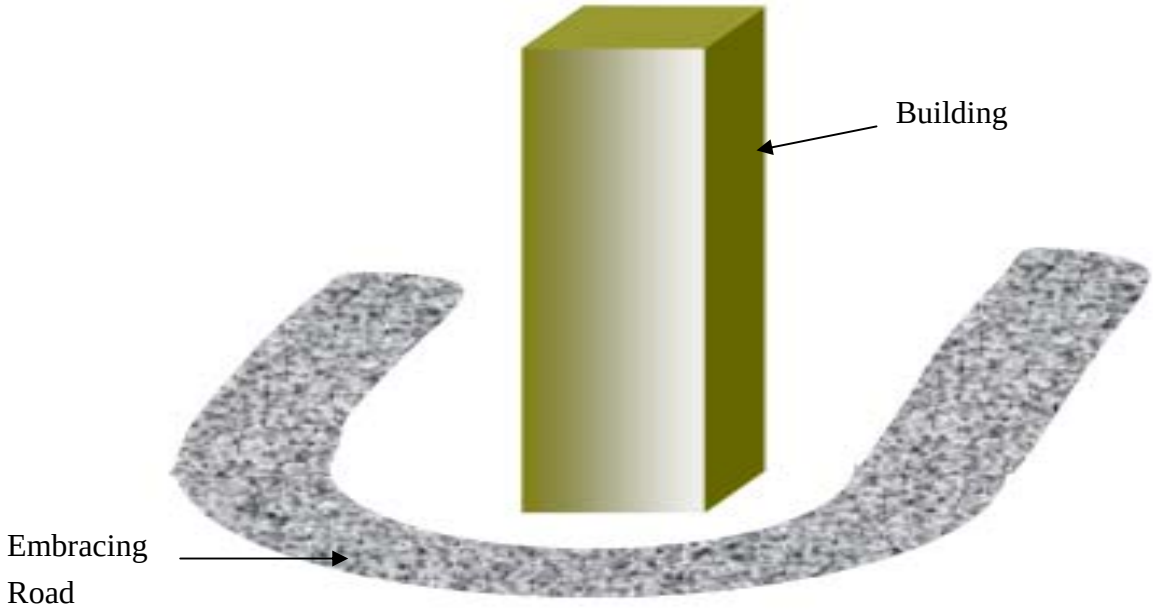


Fig 3.2 Embracing Road

Ling Tang Water（WATER）

In Feng Shui, water symbolizes money. “Ling tang water” （零堂水） is good because water is round and money is balanced and accumulates in front of a house. Water gives “chi” to occupants. It should be close enough for the house to benefit from water’s “chi”, but not so close enough for the house as to be destructive and dangerous. Some buildings in Allway Gardens are located appropriately in front of “ling tang water” and it can bring wealth to the apartments. The digit of dummy variable should be 1 when units enjoy “ling tang water”. Otherwise, the variable is coded with 0 (Appendix 5).

Ming Tang（MT）

As mentioned in Literature Review, “Ming tang”(明堂) brings “chi” and is good to occupants. “Ming tang” is the flatland in front of a house. For Mei Foo Sun Chuen Phase 3, Lai Chi Kok Park is neat and there are only few rocks inside. Living in flats which can face the park would feel very relaxed. There are also some “ming tang”s like podiums located in Mei Foo and Allway Gardens. By investigating the quality like size, flatness and noise of these “ming tang”s, all good “ming tang”s pose 1 as digit of dummy variable and 0 if otherwise (Appendix 6).

Dragon or Tiger (DT)

The “green dragon” (青龍) on the left hand side and “white tiger”（白虎）on the right hand side protect the building and retain “chi” inside as described in Literature Review. Omission of one or both sides would lead to the lack of an enclosed space which prevents units from outside intrusion. Dragon and tiger are just technical name which symbolize the nearby supports of a building. In the past, they referred to hills on the left/right of a building. But now, many buildings in Hong Kong are surrounded by building structures. The existence of a building next to the subject properties can be the tiger or dragon in Feng Shui principles. Dragon or tiger poses a positive impact on the site and it can be classified as dummy 1 and 0 if otherwise (Appendix 7).

The expected sign of the variables are summarized as follows:

Variables	**Expected Signs of Estimated Coefficients**
STRUCTURAL TRAITS	
AGE	Negative
GFA	Positive
GFA^2	Negative
LOCATIONAL TRAITS	
L	?
L^2	?
FL	Positive
FL^2	Negative
NEIGHBORHOOD TRATS	
POOL	Positive
PPOOL	Positive

PK	Positive
PPK	Positive
FENG SHUI TRAITS	
FS	Positive
FS^2	?
B*FS	Positive
S*FS	Positive
HL	Negative
HW	Negative
SL	Negative
CW	Negative
NE	Negative
HILL	Negative
ER	Positive
WATER	Positive
MT	Positive
DT	Positive

Table 3.1 Summary of Expected Sign of Variables

3.4 Outline of Models in This Study

Four sets of models are set up for each set of sample data in Hong Kong. Those sample areas chosen for this study are Mei Foo Sun Chuen Phase 3 and Allway Gardens. Residential properties are heterogeneous in nature and it is difficult to conduct the data control. Normally, it would be compensated by introducing different traits such as structural, locational and neighborhood traits in the model. In addition, by selecting the samples carefully can optimize the control of data. Details will be

discussed in the next chapter.

3.4.1 (Stage 1) Testing the Existence of Effects of Feng Shui Landscapes on Property prices

Before testing Feng Shui landscape is a luxury goods, the first stage is to test whether Feng Shui landscape has impact on residential property prices. In this study, logarithmic functional forms will be applied.

Mei Foo Sun Chuen Phase 3

$$logP = a_0 + a_1AGE + a_2L + a_3 L^2 + a_4GFA + a_5GFA^2 + a_6 FL + a_7FL^2 + a_8PK + a_9PPK \ldots\ldots\ldots\

Allway Gardens

$$logP = a_0 + a_1AGE + a_2L + a_3 L^2 + a_4GFA + a_5GFA^2 + a_6 FL + a_7FL^2 + a_8POOL + a_9PPOOL \ldots\ldots\ldots\

Allway Gardens

$$logP= a_0 + a_1AGE + a_2L+a_3 L^2+ a_4GFA + a_5GFA^2 + a_6 FL + a_7FL^2+$$

$$a_8POOL + a_9PPOOL + + a_{10}FS+ a_{11}FS^2\ a_{12}B*FS +a_{13}S*FS\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots(6)$$

3.4.3 (Stage 3) Testing the Effects of Each Feng Shui Landscape Variable

Mei Foo Sun Chuen Phase 3

$$logP= a_0 + a_1AGE + a_2L+a_3 L^2+ a_4GFA + a_5GFA^2 + a_6 FL + a_7FL^2+ a_8PK$$

$$+ a_9PPK + a_{10}CW + a_{11}HW + a_{12}SL + a_{13}DT + a_{14}MT\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots(7)$$

Allway Gardens

$$logP= a_0 + a_1AGE +a_2L+a_3 L^2+ a_4GFA + a_5GFA^2 + a_6 FL + a_7FL^2+ a_8POOL$$

$$+ a_9PPOOL +a_{10}HL, + a_{11}DT + a_{12}SL + a_{13}ER + a_{14}WATER + a_{15}MT + a_{16}HILL$$

$$+a_{17}NE\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots(8)$$

In this stage, Feng Shui landscape is divided into different principles to show which principles have significant impact on housing prices. It should be noted that some Feng Shui landscape attributes for both estates are different although they are based on the “Form” School. This is because different estates have different environment. Some attributes like HL (hospital) which only appears in model of Allway Gardens,

are not suitable for the case of Mei Foo Sun Chuen Phase 3.

3.4.4 (Stage 4) Testing the Predictive Power of the Proposed Models

Over 12-year period, ten percent of all transaction data are being selected for the investigation of the predictive power of the proposed Feng Shui equations. Each predictive price is calculated by the new proposed models and common models and then these results are compared with real property prices. The percentage of absolute difference between predictive and real prices can be analyzed. If common regression models have lower predictive power than Feng Shui models, the average difference should be larger for common model.

3.5 Concluding Remarks

In this chapter, we have studied the determinants of property prices. Different stages of regression analysis have also been discussed. Next, we will examine how the data are collected.

Chapter 4

Data and Sources

4.1 Introduction

In this part, details of the data used in the empirical models are presented. Selection of properties, sources of data and the period under investigation are explained. There are totally 1,797 transactions from Allway Gardens and 1,126 transactions from Mei Foo Sun Chuen Phase3.

4.2 Housing Transaction Records

The period of the transaction data is from 1st January 1996 to 31st December, 2007. Although the latest data, data from 2008 onwards is also available, they are not used for this dissertation. One major reason is that the real property prices from 2008 to 2009 cannot be assessed accurately as no provisional Private Domestic Price Indices are available.

4.3 Selection of Housing Estates

Both Mei Fu Sun Chuen Phase 3 and Allway Gardens are examined. Transactions in

these estates are active that a large sample size can be taken for regression analysis. Villages in the New Territories are not considered because transactions are not active there.

4.3.1 Mei Foo Sun Chuen Phase 3

Mei Foo Sun Chuen is comprised of eight phases. There are 213 housing blocks in total with the first phase completed in 1968. Phase 3 would be analyzed in this dissertation because some blocks in phase 3 can face the large park called Lai Chi Kok Park. In Feng Shui, large park is a very good Ming Tang where “chi” can be accumulated. At the same time, some can face the straight highway which is a major penalty in Feng Shui landscape. This major difference enhances the distinction of Feng Shui landscape for analysis within the same real estate. Mei Foo Sun Chuen Phase 3 consists of 36 blocks which is as large as a single residential estate (Fig.4.1).

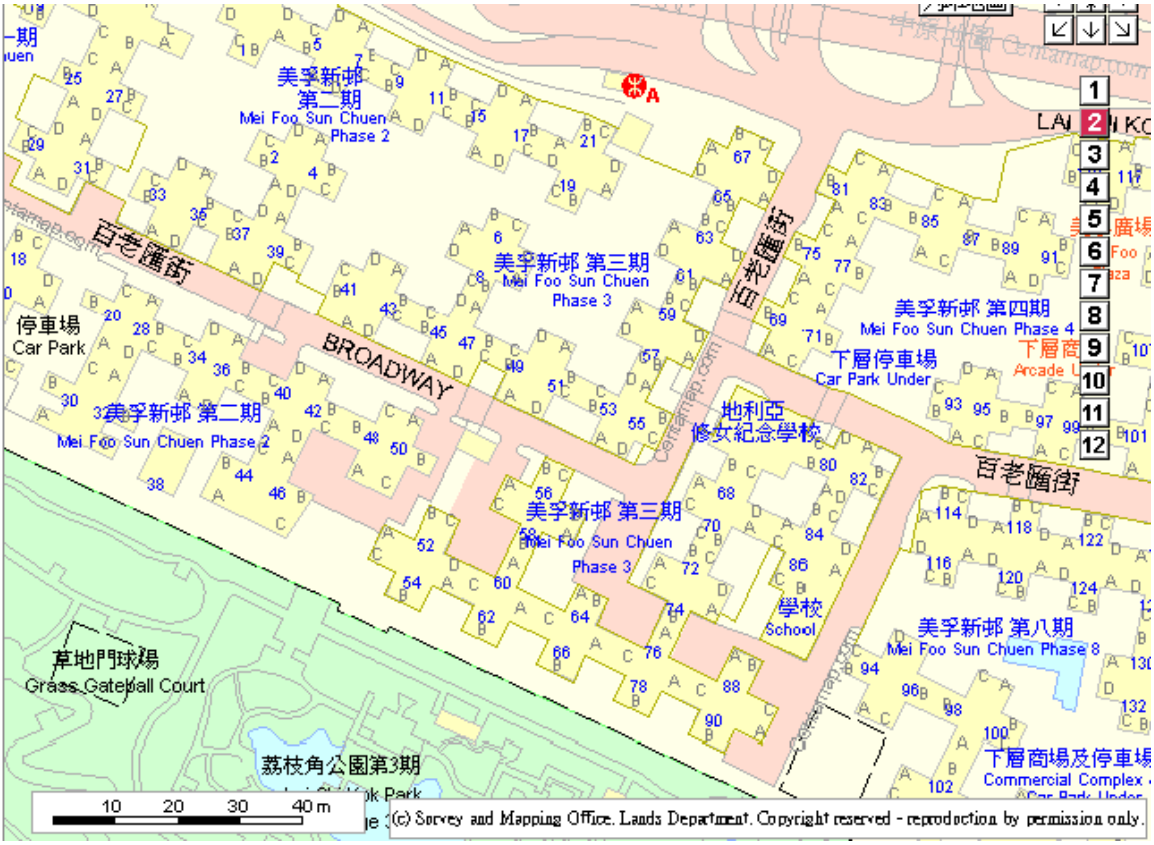


Fig.4.1 Location Map of Mei Foo Sun Chuen Phase 3[75]

4.3.2 Allway Gardens

Allway Gardens is a private housing estate situated in Tsuen Wan. It consists of 16 residential blocks. Allway Gardens is investigated because of the apparent difference of Feng Shui landscape within the estate. Some buildings are facing the Adventist Hospital and hills which implies penalty to units from Feng Shui perspectives. On the contrary, some are facing “ming tang” and “embracing road” which are all good in Feng Shui. In general, the difference of quality of Feng Shui landscape is larger for

[75] Centamap(2008) www.centamap.com [Accessed 12-12-09]

Allway Garden than Mei Foo Sun Chuen Phase 3.

Fig. 4.2 Location Map of Allway Gardens[76]

4.4 Descriptive Statistics

The following table is the descriptive statistics:

Mei Foo Sun Chuen Phase 3				
Variable	**Max.**	**Min.**	**Mean**	**Std. Dev.**
Dependent Variable:				
P	9,050,400	1,367,800	2,834,907	1,360,947

[76] Centamap (2008) www.centamap.com [Accessed 12-12-08]

Independent Variables:				
Structural Traits:				
AGE	37	36	36.796	0.402
GFA	1,800	680	1,008.526	327.517
FL	20	1	11.321	5.198
Location Traits				
L	10	0	4.461	3.121
Neighborhood Traits				
PK	1	0	0.036	0.187
PPK	1	0	0.100	0.300
Feng Shui Traits				
FS	10	0	5.767	1.968
B	1	0	0.060	0.238
S	1	0	0.021	0.144
DT	1	0	0.053	0.224
SL	1	0	0.137	0.344
MT	1	0	0.352	0.477
NE	1	0	0.047	0.213
HW	1	0	0.046	0.231
CW	1	0	0.126	0.332
Number of transactions: 1,126				

Table 4.1 Descriptive Statistics for Mei Foo Sun Chuen Phase 3

Allway Gardens				
Variable	**Max.**	**Min.**	**Mean**	**Std. Dev.**
Dependent Variable:				
P	1,930,066	597,802	1,277,636	198,450.8
Independent Variables:				
Structural Traits:				
AGE	31	28	29.405	1.114
GFA	662	459	565.145	46.239
FL	36	2	19.580	8.599
Location Traits				
L	10	0	5.988	2.793
Neighborhood Traits				
POOL	1	0	0.040	0.197
PPOOL	1	0	0.018	0.134
Feng Shui Traits				
FS	10	0	5.089	1.215
B	1	0	0.098	0.298
S	1	0	0.021	0.145
DT	1	0	0.083	0.276
SL	1	0	0.053	0.226
MT	1	0	0.135	0.342
NE	1	0	0.065	0.246
HL	1	0	0.050	0.219
ER	1	0	0.189	0.381
WATER	1	0	0.058	0.234

HILL	1	0	0.336	0.472
Number of transactions: 1,797				

Table 4.2 Descriptive Statistics for Allway Gardens

4.5 Descriptions and Reliability of the Sources of Data

The selection of data and data sources are mainly based on the following:

Economic Property Research Centre (EPRC) and Midland

Location maps

Site Visits

Hong Kong Property Review

4.5.1 Economic Property Research Centre (EPRC) and Midland

Economic Property Research Centre (EPRC) database contains transaction records of Mei Foo Sun Chuen Phase3 and Allway Garden registered in Land Registry. The earliest records in the database are in 1991. EPRC gives the transaction records registered in Land Registry and a lot of transaction-related information. The information provided includes transaction prices, transaction dates, gross floor area, saleable floor area, floor levels, room numbers, dates of issuance of occupation permit, types of facilities provided and floor plans of each property.

Problems of duplication might arise if transactions are extracted from the EPRC. Every transaction can involve more than a single agreement, for instance, provisional agreement for sale and purchase (PASP) and assignment. As not all transactions involve PASP and assignment as agreements, transactions which include PASP might dominate and destruct the empirical results. Therefore, repeated data set must be removed in order not to double count. Only transactions with agreement for sale and purchase (ASP) will be considered.

However, not every transaction has its own floor plan. For Feng Shui landscape investigation, another source of data which contains floor plan is Midland[77]. This database also provides similar information as EPRC. Because it provides transaction dates, prices, floor levels and room numbers, a transaction record can be traced back to the one in EPRC. The earliest records for Midland are in 1996.

4.5.2 Location Maps

Information for independent variables, such as the location of hospital (HL), MTR exit and bus terminal (L), and hill (HILL) cannot be found in the EPRC either. These

[77] Midland（2009）www.midland.com.hk [accessed 1-2-09]

data are found from other websites- Centamap[78] and Midland[79]. They both provide location maps for Feng Shui investigation. The maps are also used to scale the horizontal distance between the blocks where transaction took place and variables concerned.

4.5.3 Site Visits

Site visits are conducted in order to obtain information about the quality of view and Feng Shui landscape. The author is not possible to access the blocks one by one and survey their view due to security reason. Therefore, view can be figured out by standing in the same orientation of a building with the help of a map. If some variables that can affect the view, e.g. such as blockage of view by other structures, have been discovered, adjustment would be made accordingly. Shapes and forms of the landscape are investigated like the shape of the hills which cannot be based on the map alone. Photos are taken to show the landscape as an appendix for this research.

4.5.4 Hong Kong Property review

As mentioned in methodology, transaction prices are deflated at different time period to a common base so that time effect on properties can be minimized. The Private Domestic (Price Indices for Selected Popular Development) – Monthly Price

[78] Centamap (2009)www.centamap.com [accessed 1-2-09]

[79] Midland (2009) www.midland.com.hk[accessed 1-2-09]

Indices published in the Hong Kong Property Review will be used instead of quarterly or yearly prices. The monthly price index is based on the analysis of prices paid for flats in popular estate developments in Hong Kong. Further details can be found in the Technical Notes 14 of Hong Kong Property Review. The graph shows the fluctuation of indices within the time frame.

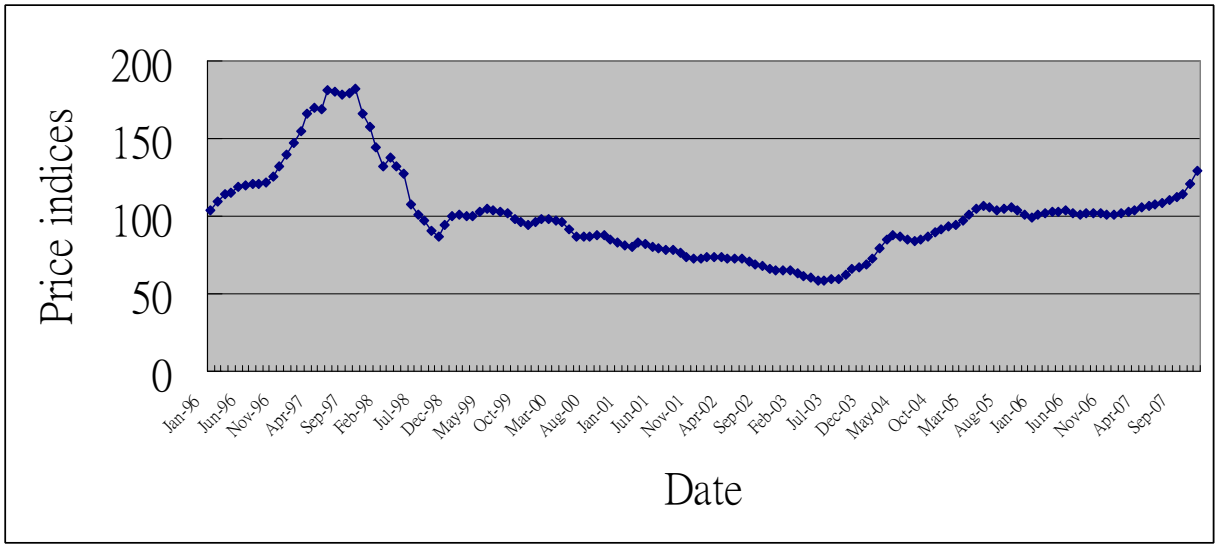


Fig. 4.3 Change of Domestic Monthly Price Indices from 1996 to 2007

4.5.5 Data Control

"Di yun" "地運"of a building means the "birth date" of a building. Different period of birth should have different fate from Feng Shui point of view. So, same "di yun" should be taken into consideration. The birth date of a building refers to the date of occupation permit. In order to control the effect of "di yun", blocks in the same phase

of Mei Foo Sun Chuen are chosen because they are occupied within the same period. All buildings of phase 3 are "6th yun" buildings because they were occupied from 1972 to 1973. Buildings occupied from 1964 to 1984 are called "6th yun" buildings. Allway Gardens is also a "6th yun" estate because all blocks are built from 1978 to 1981.

Common variables include age, floor level, gross floor area (structural traits), park and swimming pool (neighborhood traits) as factors affecting property prices. All of these factors have been included in this dissertation. Regarding locational factors, access to distance from MTR exit and bus terminal have been concerned. However, review in chapter 2 includes another important locational factor - accessibility to shopping centre. There are retail shops and recreational facilities within Mei Foo Sun Chuen and Allway Gardens, located at and under the podiums. The podium aims at joining different towers together. Residents are able to access to different retail shops very easily and so the locational effects due to accessibility to retails shops are also reduced. All residents have to travel by bus or the MTR to get to major shopping centres. Therefore, the ease of reaching other shopping centres outside the estate depends on the distance between the subject block and the bus terminal and the MTR exit. They are already included in the locational attribute, L.

4.6 Concluding Remarks

This chapter has discussed sources of housing prices, and details of the data used in the empirical analysis. In the following chapter, results of the estimated models are going to be analyzed.

CHAPTER FIVE

Empirical Results and Interpretations

5.1 Introduction

Eviews will be adopted to generate regression results for all models. Parameters in this model would be estimated by the sample data of Allway Gardens and Mei Foo Sun Chuen Phase 3. In this chapter, results of the estimated models are going to be analyzed.

5.2 (Stage 1) Testing the Existence of Effects of Feng Shui Landscapes on Property prices

Mei Foo Sun Chuen Phase 3

$$logP = a_0 + a_1AGE + a_2L + a_3 L^2 + a_4GFA + a_5GFA^2 + a_6 FL + a_7FL^2 + a_8PK + a_9PPK \quad \text{(1)}$$

where

P =real price

AGE = building age

L =location

GFA= gross floor area

FL = floor level

PK = park view

PPOOL = partial park view

A common hedonic price model (1) will be compared with the one added with Feng Shui landscape (2). The regression results of regression analysis of model (1) are summarized as follows:

Dependent Variable: LOG(P)
Method: Least Squares
Included observations: 1126

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	13.61395	0.336540	40.45271	0.0000
AGE	-0.010696	0.008876	-1.205086	0.2284
L	0.001132	0.004812	0.235170	0.8141
L^2	-1.83E-05	0.000540	-0.033872	0.9730
GFA	0.001778	0.000106	16.69648	0.0000
GFA^2	-3.54E-07	5.16E-08	-6.860861	0.0000
FL	0.025121	0.002689	9.343936	0.0000
FL^2	-0.001002	0.000118	-8.522741	0.0000
PK	0.348904	0.039635	8.802935	0.0000
PPK	0.148635	0.031368	4.738380	0.0000
R-squared	0.925697			
Adjusted R-squared	0.925098			
F-statistic	1544.846			
Prob(F-statistic)	0.000000			

Table 5.1 Results of common model for Mei Foo Sun Chuen Phase 3

In this regression model, the signs of the coefficients of GFA, FL and PK and PPK are

as expected with 1% significant level. Coefficient of AGE is negative, meaning that the valuation of a property is inversely related to the age of a building. Positive signs of GFA and FL mean that people are willing to bid for a larger unit with higher floor level. The square of both GFA and FL are negative, implying non-linearity and diminishing effects of these variables. People are less preferred to live in a unit that is too large or too high. Both signs of the coefficients of PK and PPK are positive, which mean that people are willing to pay higher price for better park view. The magnitude of coefficient of PK is larger than PPK, meaning that full park view has greater positive impact on residential units. One interesting point is that L is positive which implies that people prefer to live farther away from the convenient transport (bus terminal and MTR exit). L is increasing at a decreasing rate. This result is not generally accepted. However, some literatures bide this idea due to the negative impact of air and noise pollutions from public transport. Feng Shui landscape also considers this impact which will be discussed in Stage 3. The coefficient of determination (R-squared) is the fraction of the variance of dependent variable explained by independent variables. R-squared is 92.5% which is very satisfactory.

$$logP = a_0 + a_1 AGE + a_2 L + a_3 L^2 + a_4 GFA + a_5 GFA^2 + a_6 FL + a_7 FL^2 + a_8 PK + a_9 PPK + + a_{10} FS + a_{11} FS \ldots\ldots\ldots\

F= Feng Shui landscape

FS^2= Square of Feng Shui Landscape

Dependent Variable: LOG(P)

Method: Least Squares

Included observations: 1126

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	13.27690	0.347086	38.25245	0.0000
AGE	-0.004166	0.009038	-0.460985	0.6449
L	0.009497	0.005581	1.701833	0.0891
L^2	-0.000989	0.000601	-1.645717	0.1001
GFA	0.001860	0.000109	17.07744	0.0000
GFA^2	-3.93E-07	5.25E-08	-7.470623	0.0000
FL	0.025467	0.002686	9.483212	0.0000
FL^2	-0.001015	0.000117	-8.659101	0.0000
PK	0.379841	0.045761	8.300607	0.0000
PPK	0.155294	0.033361	4.654908	0.0000
FS	0.026325	0.007641	3.445131	0.0006
FS^2	-0.002169	0.000774	-2.803329	0.0051
R-squared	0.946632			
Adjusted R-squared	0.945908			
F-statistic	1279.067			
Prob(F-statistic)	0.000000			

Table 5.2 Results of Feng Shui Model for Mei Foo Sun Chuen Phase 3

Coefficient of FS is positive and it is significant at 1% level. For the coefficient of FS-squared, it is negative. It means that the effect of FS is increasing at a decreasing rate. With Feng Shui landscape is added to the equation, the model's R- squared is increased to 0.946.It means that 94.6% of the variations of the dependent variable can be explained by the independent variables. It indicates that selected attributes

are major determinants of property prices in Mei Foo Sun Chuen Phase 3.

Allway Gardens

$$logP = a_0 + a_1AGE + a_2L + a_3 L^2 + a_4GFA + a_5GFA^2 + a_6 FL + a_7FL^2 + a_8POOL + a_9PPOOL \quad \ldots\ldots(3)$$

where

POOL = swimming pool view

PPOOL = partial swimming pool view

Dependent Variable: LOG(P)

Method: Least Squares

Included observations: 1797

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	12.51708	0.551691	22.68856	0.0000
AGE	-0.004807	0.004838	-0.993592	0.3206
L	0.003118	0.003108	1.003249	0.3159
L^2	-0.000332	0.000274	-1.214467	0.2247
GFA	0.003201	0.001710	1.872381	0.0613
GFA^2	-9.15E-07	1.51E-06	-0.604057	0.5459
FL	0.011137	0.001327	8.394336	0.0000
FL^2	-0.000148	3.22E-05	-4.592219	0.0000
POOL	0.037585	0.012647	2.971828	0.0030
PPOOL	0.069020	0.018486	3.733565	0.0002
R-squared	0.578181			
Adjusted R-squared	0.576057			
F-statistic	272.1574			
Prob(F-statistic)	0.000000			

Table 5.3 Results of Common Model for Allway Gardens

In this model, we can see that signs of the coefficient of GFA and FL are positive as expected. Signs of coefficients of traits which are included in both Mei Foo Sun Chuen Phase 3 and Allway Gardens are consistent. The negative sign of L-squared means that L is increasing in a decreasing rate. Coefficients of POOL and PPOOL are positive. It means that no matter how much the units expose to swimming pool view, there will be a bonus.

Results are only quite satisfactory. Only floor level, partial swimming pool view and full swimming pool view are significant at 1% level. The R-squared is 57.8% which means the variation in the dependent variable, P, cannot be largely explained by the variation in the independent variables. It may be due to long history of the estate. Age of all buildings in Allway Gardens is around 29 years and the observation period for this dissertation is 12 years. Apartments would be renovated or redecorated over this period which can enhance transaction prices for particular units. Another reason may be due to the errors in the dependent variable, P. Value of the deflated property prices are based on price indices from the Rating and Valuation Department. As discussed in chapter 4, it is calculated from selected housing estates in Hong Kong but not specifically from Allway Gardens. Hence the price indices are representing those popular estates but not any individual housing estate. The price deflators cannot reflect any price fluctuation of specific housing estate as they are generated from

selected housing estates with different characteristics.

$$logP = a_0 + a_1 AGE + a_2 L + a_3 L^2 + a_4 GFA + a_5 GFA^2 + a_6 FL + a_7 FL^2 +$$

$$a_8 POOL + a_9 PPOOL + + a_{10} FS + a_{11} FS^2 \ldots\ldots\ldots\

The coefficient of FS is positive and is significant at 99% confidence level. It proves that good Feng Shui landscape brings significant positive impact to property prices. The coefficient of FS is 0.074 and 0.026 for Allway Gardens and Mei Foo Sun Chuen Phase 3 respectively. It implies that the effect of good FS is larger and improves more in Allway Gardens. This is consistent with the Feng Shui practitioner's point of view that Allway Gardens' Feng Shui landscape varies more within an estate than that in Mei Foo Sun Chuen Phase 3. A very satisfactory result is that the magnitude of coefficient of FS is the largest when compared with other common variables in Allway Gardens. It implies that different Feng Shui landscape varies property prices a lot. Variable of FS-squared is negative implying that the effect of good Feng Shui landscape is increasing at a decreasing rate and there will be maximum amount that people are willing to pay for good Feng Shui landscape. It is observed that area and partial swimming pool view are relatively unimportant to people. They still have great concerns on the Feng Shui landscape, location, age and floor level when they choose their apartments.

5.3 (Stage 2) Testing the Effects of Feng Shui Landscape on Property Prices during the Boom and the Slump Periods

To test whether the premia of good Feng Shui landscape are higher during the boom period, an interaction term B*FS is added to equation (5) and (6). This result is going to be compared with the effect of FS during the slump period which is indicated by S*FS.

Mei Foo Sun Chuen Phase 3

$$logP = a_0 + a_1AGE + a_2L + a_3L^2 + a_4GFA + a_5GFA^2 + a_6FL + a_7FL^2 +$$

$$a_8PK + a_9PPK + + a_{10}FS + a_{11}FS^2 + a_{12}B*FS + a_{13}S*FS \ldots\ldots\ldots\

the Boom and the Slump Period

Allway Gardens

$$logP = a_0 + a_1AGE + a_2L + a_3 L^2 + a_4GFA + a_5GFA^2 + a_6 FL + a_7FL^2 +$$

$$a_8POOL + a_9PPOOL + + a_{10}FS + a_{11}FS^2\ a_{12}B*FS + a_{13}S*FS \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (6)$$

Dependent Variable: LOG(P)

Method: Least Squares

Date: 02/25/09 Time: 22:50

Sample: 1 1797

Included observations: 1797

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	11.91933	0.498429	23.91378	0.0000
AGE	-0.020776	0.004537	-4.579492	0.0000
L	0.008103	0.002883	2.810883	0.0050
L^2	-0.000846	0.000253	-3.343178	0.0008
GFA	0.001824	0.001541	1.183738	0.2367
GFA^2	2.29E-07	1.36E-06	0.167723	0.8668
FL	0.009180	0.001194	7.690954	0.0000
FL^2	-0.000114	2.89E-05	-3.939040	0.0001
POOL	0.034493	0.014045	2.455943	0.0141
PPOOL	0.037288	0.016651	2.239396	0.0253
FS	0.075667	0.010860	6.967664	0.0000
FS^2	-0.003301	0.001094	-3.018020	0.0026
B*FS	0.011028	0.001343	6.677637	0.0000
S*FS	0.008971	0.002812	3.921479	0.0001

R-squared	0.661624
Adjusted R-squared	0.659157
F-statistic	268.1765
Prob(F-statistic)	0.000000

Table 5.6 Results of Model for Allway Gardens during

the Boom and the Slump Period

As shown in both cases, all variables related to good Feng Shui landscape are positive. In Mei Foo Sun Chuen Phase 3, the effect of S*FS is insignificant and should be discarded. In the case of Allway Gardens, B* FS and S*FS are significant at 99% confidence level. The magnitude of coefficient of premia for FS is higher in the boom period than the slump period for both estates. The result shows that the premia brought by good Feng Shui landscape is more severe during the boom period. Premia for good Feng Shui landscape are 0.6% and 1% of property prices in Mei Foo and Allway Gardens respectively during the boom period. It implies that people tend to pay extra money for good Feng Shui landscape when the economy is good. When the economic is bad, they would have a tighter budget. Implicit prices of the intangible attribute, good Feng Shui landscape, are unstable and their behaviors resemble the prices of luxury goods. Premia of this attribute may change from positive to zero from the boom to the slump. Investing in good Feng Shui landscape is thus potentially riskier.

5.4 (Stage 3) Testing the Effects of Each Feng Shui Landscape Variable

Allway Garden

$$logP = a_0 + a_1 AGE + a_2 L + a_3 L^2 + a_4 GFA + a_5 GFA^2 + a_6 FL + a_7 FL^2 + a_8 POOL$$

$+ a_9PPOOL + a_{10}HL, + a_{11}DT + a_{12}SL + a_{13}ER + a_{14}WATER + a_{15}MT + a_{16}HILL$

$+a_{17}NE \ldots\ldots\ldots\

HL	-0.025448	0.015559	-1.635543	0.1021
DT	0.045747	0.009058	5.050467	0.0000
SL	-0.061465	0.011823	-5.198918	0.0000
ER	0.040832	0.010132	4.030038	0.0001
WATER	0.124083	0.098532	1.259308	0.2081
MT	0.017468	0.009531	1.832733	0.0670
HILL	-0.064043	0.007043	-9.093008	0.0000
NE	-0.079851	0.014127	-5.652390	0.0000
R-squared	0.631570			
Adjusted R-squared	0.628049			
F-statistic	179.3882			
Prob(F-statistic)	0.000000			

Table 5.7 Results of Model with Feng Shui Principles for Allway Gardens

For all variables, signs of coefficients are as expected. The positive signs of POOL, PPOOL, DT, ER, MT and WATER show that people are willing to pay extra money for swimming pool view, building with dragon or tiger support, “embracing road” , “ming tang” and “ling tang water”. As buildings supported by dragon and tiger are good, the result shows that DT has positive impact on flats within these buildings. DT is significant at 99% confidence level which means its impact to property prices is significant. The sign of coefficient of ER is positive, which means that people are willing to pay higher price for “embracing road” and it is significant at 1% level. The positive sign of “ming tang” suggests that people are willing to bid for a flat with “ming tang” in front of it which accumulates good “chi”. For “ling tang water”, people are willing to pay 12% more for it but the p-value shows that it is insignificant.

The coefficient of HILL is negative and significant at 1% level. It means that when an apartment is facing the hills nearly, fewer people would like to live in. It poses a negative impact to the flats because of less accumulation of “chi” at the front of the flat. The coefficient of HL is negative, which means that property prices are negatively affected by the existence of a hospital. This is consistent with Feng Shui landscape principles which emphasize that hospital can indirectly harm the health of people living in the subject properties.

Apart from the above expected results, some interesting results are discovered for some variables. The first discovery is the signs of coefficients of NE and L. Although most researchers explain people would live near to the public transport facilities, the positive sign of L in this finding is consistent with the result of NE. NE is negative as expected. From Feng Shui point of view, noise’s bad “chi” from public transport affects one’s health. Therefore, the positive sign of L can be explained by Feng Shui which means people would like to live farther away from the bus terminal. That means Feng Shui landscape principle overrides the concept of convenience for public transport as generally expected. Another interesting result is SL. Previous literatures suggest that property prices should be higher when units are near to school as a neighborhood trait. However, the coefficient of SL is negative and significant at 1%

level which is consistent with Feng Shui principle. It shows that Hong Kong people require compensation when purchasing a unit near a school. Therefore, Feng Shui landscape principle overrides the general concepts.

Mei Foo Sun Chuen Phase 3

$$logP = a_0 + a_1AGE + a_2L + a_3L^2 + a_4GFA + a_5GFA^2 + a_6FL + a_7FL^2 + a_8PK$$

$$+ a_9PPK + a_{10}CW + a_{11}HW + a_{12}SL + a_{13}DT + a_{14}MT \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad (8)$$

Where

CW = Construction works

HW = Highway

SL = School

DT = Dragon or Tiger

MT = Ming Tang

Dependent Variable: LOG(P)

Method: Least Squares

Included observations: 1126

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	13.20756	0.411864	32.06774	0.0000
AGE	-0.000131	0.010846	-0.012079	0.9904
L	0.008908	0.007008	1.270978	0.2040
L^2	-0.000836	0.000762	-1.096913	0.2729
GFA	0.001832	0.000111	16.57661	0.0000
GFA^2	-3.79E-07	5.25E-08	-7.227465	0.0000
FL	0.025630	0.002687	9.538460	0.0000
FL^2	-0.001025	0.000117	-8.733595	0.0000

PK	0.339196	0.039516	8.583662	0.0000
PPK	0.135289	0.031427	4.304935	0.0000
CW	-0.010144	0.0 09145	-1.109281	0.2675
HW	-0.073027	0.021211	-3.442907	0.0006
SL	-0.000579	0.011615	-0.049826	0.9603
DT	0.009311	0.015910	0.585205	0.5585
MT	0.013769	0.009394	1.465701	0.1430
R-squared	0.947123			
Adjusted R-squared	0.946205			
F-statistic	1009.568			
Prob(F-statistic)	0.000000			

Table 5.8 Results of Model with Feng Shui Principles

for Mei Foo Sun Chuen Phase 3

The coefficient of SL is negative whereas for DT and MT, the signs are positive. These signs are consistent with the results in Allway Gardens. A new attribute (HW) which is specialized only for Mei Foo Sun Chuen Phase 3 shows that people pay 7% less for highway. HW is significant at 1% level. Concerning the p-value of CW, it can be deduced that the stigma effect of construction work is insignificant. The whole construction work for the West Railway Line lasts for only 2 years. Purchasers would realize that negative Feng Shui impact would disappear after two years. As to most of them, buying apartments is a long term investment except for small proportion of speculation in the residential market. Two-year period is bearable and they would tend to accept the usual prices of properties. Therefore, the result for CW is insignificant.

5.5 (Stage 4) Testing the Predictive Power of the Proposed Models

The predictive power of a Feng Shui equation can be tested against the one without Feng Shui. Firstly, equations can be derived from the results in stage 1. Equation (1) and (3) in stage 1 represents common regression models whereas equation (2) and (4) are new proposed Feng Shui equations. Then, ten percent of all transaction data are selected for sampling. Using Eviews, all predictive prices are compared with the real property prices.

$$\frac{|P_1 - R_1| / R_1 + |P_2 - R_2| / R_2 + \cdots + |P_n - R_n| / R_n}{n} \quad \text{.....(9)}$$

Equation (9) can attain the mean of the percentage of absolute difference between predictive and real prices. P is the predictive price. R is the real transaction price. n is the number of samples. The mean can show the predictive power of Feng Shui models and common models.

Mei Foo Sun Chuen Phase 3			
Mean %	**Max. %**	**Min. %**	**Std. Dev**
Without Feng Shui landscape			
5.60258	19.55479	0.019149	4.210157

With Feng Shui			
5.562631	18.77963	0.096558	4.107112
Sample data: 112			

Table 5.9 Predictive power for Mei Foo Sun Chuen Phase 3

Allway Gardens			
Mean %	**Max. %**	**Min. %**	**Std. Dev**
Without Feng Shui landscape			
9.040030	40.25427	0.079723	7.430461
With Feng Shui			
8.244474	34.40833	0.045239	5.966455
Sample data: 179			

Table 5.10 Predictive power for Allway Gardens

From the results shown in the tables above, we can analyse that both Feng Shui models have higher predictive power than common models. Even for the common models, the mean differences are only 5.602 % and 9.040% in Mei Foo Sun Chuen Phase 3 and Allway Gardens respectively which shows that their predictive power is very satisfactory. In Mei Foo Sun Cheun Phase 3, the predictive power of Feng Shui model has increased to 5.562%. This slight improvement of predictive power (increased by 0.039 %) is consistent with the results in stage 1. The predictive power of common model is higher for Mei Foo Sun Chuen Phase 3 than for Allway Gardens. This shows the same results as in stage 1 when R-squared terms are studied. The

predictive power of Feng Shui model has improved more in Allway Gardens. The predictive power is increased by 0.795% which is satisfactory.

Chapter 6

Conclusion

6.1 Summary of Findings

Having extracted data for property prices from the database of the EPRC, hedonic price analysis are carried out. This period covers the boom and the slump periods of the residential property market, which is very useful for the test in stage 2. There are 1,112 transactions and 1,797 transactions for Mei Foo Sun Chuen Phase 3 and Allway Gardens respectively. The observation period is from 1996 to 2007.

In stage 1, a modified equation based on previous literatures shows the rise of property prices after good Feng Shui landscape is involved. It also confirms that, by comparing the common regression model with the proposed Feng Shui model, Feng Shui landscape can increase the explanatory power of the regression models. Feng Shui landscape variable is significant and consistent with the expected results.

In this study, the author has chosen Allway Gardens and Mei Foo Sun Chuen Phase 3 to examine the impact of Feng Shui on property prices in Hong Kong during the boom and the slump period. It is found that the effect of Feng Shui landscape is categorized to a certain period of time. Purchasers pay premia for good Feng Shui

landscape during the property boom period but are much less willing to do so during the slump period. Good Feng Shui Landscape acts as a luxury goods for property prices.

For the better understanding of Feng Shui landscape, other hedonic models are set up to indicate the effect of every Feng Shui principle on property prices. With the help of Eviews, it shows that results of Mei Foo Sun Chuen Phase 3 matches with those of Allway Gardens. Certain Feng Shui landscape attributes have significant impact to property prices. They are dragon and tiger (DT), school (SL), hospital (HL), "embracing road"(ER), "ming tang" (MT), hill (HILL), noise (NE) and highway (HW). Therefore, by analyzing the results for Mei Foo Sun Chuen Phase 3 and Allway Gardens, a general equation can be produced for developers, town planners, surveyors and individuals. This is called "nine Feng Shui landscape traits" equation proposed by the author for this dissertation.

$$logP = a_0 + a_1AGE + a_2L + a_3L^2 + a_4GFA + a_5GFA^2 + a_6FL + a_7FL^2 + a_8PK + a_9PPK + a_{10}POOL + a_{11}PPOOL + a_{12}DT + a_{13}SL + a_{14}HL + a_{15}ER + a_{16}MT + a_{17}HILL + a_{18}NE + a_{19}HW \quad (10)$$

The following table shows the signs of Feng Shui landscape traits in this general

equation:

Feng Shui Traits	Signs of Estimated Coefficients
DT	Positive
SL	Negative
HL	Negative
ER	Positive
WATER	Positive
MT	Positive
HILL	Negative
NE	Negative
HY	Negative

Table 6.1 Signs of Feng Shui Landscape Attributes

Some Feng Shui variables are not consistent with previous literatures but consistent with the principles of Feng Shui landscape. For example, location to bus terminal (locational factor) and school (neighborhood), they are expected to have positive impact on property prices. However, both estates have shown that they should pose negative impact to the subject properties. That means Feng Shui landscape principles override the general concepts of convenience for public transport and enjoyment of school nearby. This is a big discovery regarding the importance of Feng Shui landscape.

Then, the predictive power of the proposed models is examined. Both common models and proposed Feng Shui models perform a satisfactory result in predicting property prices. Feng Shui model has higher predictive power than common models.

The improvement of predictive power after introducing Feng Shui attribute is even much better in Allway Gardens which is consistent with the results in stage 1.

Feng Shui landscape brings significant impact to property prices in area with dominant Chinese. Besides of purely Feng Shui impacts, the results can be explained by psychological effect. The tense life style of people has magnified the psychological effects seriously. Since Feng Shui emphasizes man-land relationship, good Feng Shui landscape gives residents an impression that the environment is in harmony and thus the apartments are comfortable to live.

Hong Kong surveyors usually under-estimate the effect of Feng Shui landscape on property prices. One main reason is that limited researches have concerned about the effect of Feng Shui to residential property prices. Also, they only focus on one Feng Shui landscape variable such as “no green dragon or white tiger”. This cannot show a big picture of the impact of Feng Shui landscape on property prices. Therefore, this dissertation attempts to generalize many Feng Shui landscape principles and apply them fully to two subject estates. Surveyors can now rely on this dissertation as a guideline to maximize the accuracy of appraising residential property because the above principles can reflect part of purchasers’ behaviors. Town planners can use the

above Feng Shui principles to increase land value when zoning residential land use. Although many developers in Hong Kong have invited Feng Shui practitioners to examine the Feng Shui landscape of their land, it is definitely a breakthrough if they can quantify the Feng Shui landscape from economic point of view. Individuals can get the ideas of Feng Shui landscape principles after reading this thesis. As potential buyers can be ethical Chinese who believe in Feng Shui, they can adjust property prices from the above Feng Shui landscape principles.

6.2 Limitations of Studies

Uncertainty of defining a property subject to a particular Feng Shui landscape principle is a major limitation of this thesis. The main reason is that distance effect is ignored. All landscape principles are dummy variables only. Also, only two real estates are examined in this dissertation which cannot apply Feng Shui landscape principles fully. Some factors like graveyard also affect property prices. The main reason for not studying graveyard is that graveyard is a complicated principle in Feng Shui. Interior design of a flat can greatly affect the goodness or penalty of graveyard view. Normally, graveyard view is a penalty to the prices of the flats. But most Feng Shui practitioners believe that graveyard view can be converted to a good thing as

long as some alternations are made for the interior design. This is because graveyard represents large “yin chi”(陰氣). Money corresponds to “yin”. If the graveyard is not very close to the block, “yin chi”, that means money can be brought to the flat. But of course, it also affects the health of occupiers. Suitable interior design can therefore avoid the impact on health. This dissertation does not put the interior design of the properties into consideration. As a result some landscape factors like graveyard cannot be examined.

6.3 Further Studies

The author does not test the functional form of hedonic price model. In general, there are certain functional forms of hedonic price model used in the previous studies on price analysis. If we are not sure about the functional form, Box-Cox Transformation can be tested (Linneman, 1980)[80]:

$$P^{\lambda} = \beta_o + \Sigma \beta_i x_i^{\lambda i} + \varepsilon$$

where

P = dependent variable

[80] Linneman, P. (1980). *Some Empirical Results on the Nature of the Hedonic Price Function for the Urban Housing Market*, Jounal of Urban Economics, 8, 47-68

Xi = attributes of the dependent variable

β = regression coefficients of the respective dependent variable

λ_i = power transform factor for xi the variable

ε = error term

$$P^{\lambda} = (P^{\lambda} - 1)/\lambda \qquad \lambda \text{ is not equal to } 0$$

$$= \ln P \qquad \lambda \text{ is equal to } 0$$

$$x_i^{\lambda i} = (x_i^{\lambda i} - 1)/\lambda_i \qquad \lambda_i \text{ is not equal to } 0$$

$$= \ln x_i \qquad \lambda_i \text{ is equal to } 0$$

Different value of λ gives different functional form of the model. The functional form of linear, quadratic, logarithmic, exponential, semi-log, or log-linear are used in many researches. Other methods like quadratic and exponential models can be used to test the functional form in a different way.

As discussed in Literature Review, Feng Shui is a traditional belief of the Chinese people. Feng Shui landscape can psychologically affect the people. Hong Kong is dominant by ethical Chinese. Using Hong Kong as a base for this research can truly reflect Feng Shui impact on property prices. In Hong Kong real estate market, people

in different traditions or beliefs would have different attitudes towards Feng Shui landscape. It would make the study more comprehensive if the attitudes of the potential purchasers are studied.

In this research, only two estates are investigated for Feng Shui landscape. By using similar approach and models, more places in Hong Kong can be further studied so that it can assist the town planning over Hong Kong districts. Further studies can examine markets other than the residential market like office and retail markets. As many Hong Kong people have traditional beliefs, they would concern Feng Shui landscape in other markets. Also, foreign countries can be studied in the future because foreigners are increasingly aware of the impact of Feng Shui to an apartment.

Appendix

Appendix I Feng Shui Technical Terms

English name	Chinese name
Background Mountains	遠祖山
Becoming Wealthy Place	發富之地
Black tortoise	玄武
Central Site	穴
Chi	氣
Compass School	理氣派
Destructive	相剋
Di Yun	地運
Eight House Theory	八宅派
Embracing fondness	玉帶環腰
Engulfing the near front hill	抱案入懷
Exhaustive	相泄
Expansive	相生
Far Front Hill	朝山
Form School	形勢派
Green dragon	青龍
Guo Pu	郭璞
Inverse Bow Water	反弓水
Ling Tang Water	零堂水
Lo Shu	洛書
Ming Tang	明堂
Near front hill	案山
Neat Ming Tang	明堂整齊
Pa Kua	八卦
Principle Mountain	祖山
Protecting Hill	護山
Sky-human Coherence	天人合一
Tortoise and Snake Enclosing Water Exit	龜蛇鎖水口
Vermilion phoenix	朱雀
Water Exiting Hill	水口
White tiger	白虎
Yang	陽

Yin	陰
Zang Shu	葬書

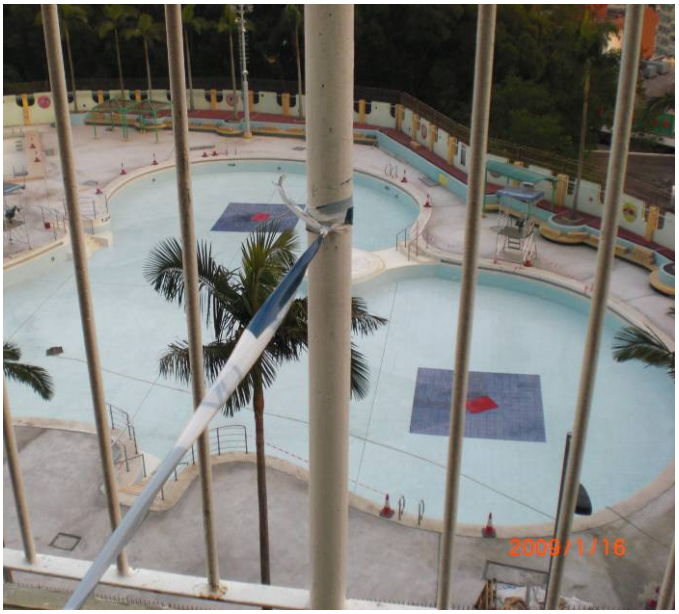
Appendix II Photos of different Feng Shui landscape Traits

Appendix 1 Hospital (HL) – Allway Gardens

Appendix 2 School (SL) – Allway Gardens

Appendix 3 Hill (HILL) – Allway Gardens

Appendix 4 Embracing Road (ER) – Allway Gardens



Appendix 5 Ling Tang Water (WATER) – Allway Gardens

Appendix 6 Ming Tang (MT) – Mei Foo Sun Chuen Phase 3

Appendix 7 Dragon or Tiger (DT) – Mei Foo Sun Chuen Phase 3

Appendix 8 Highway (HW) – Mei Foo Sun Chuen Phase 3

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